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TRANSACTIONS

OF THE

ROYAL ACADEMY OF MEDICINE IN IRELAND.

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OF THE

ROYAL ACADEMY OF MEDICINE IN IRELAND.

TRANSACTIONS

OF THE

Royal Academy of Medicine

IN IRELAND.

VOL. XX.

EDITED BY

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1883 M'Dermott, P. A., F.R.C.S., Mount Clarence, Kingstown.

1892 M'Grath, James Joseph, L.R.C.S., L.A.H., Dunfanaghy, Co. Donegal.

1901 Macrory, Elizabeth, M.B., B.Ch. Edin., L.M. Coombe, 72 Lower Leeson-street.

1900 Matson, J. Agar, M.D., B.Ch. Dubl., 16 North Great George's-street, Dublin.

1902 Moorhead, T. Gilman, M.B., B.Ch., School of Anatomy, T.C.D. [1]

1902 Neill, Thomas, M.B., B.Ch. Dub., 69 Harcourt-street.

1898 Redington, John, L.R.C.P. & S., Richmond Asylum.

1885 Ridley, George P., L.R.C.S., L.R.C.P., Surgeon King's County Infirmary, Tullamore, King's County.

1885 Shaw, James, L.R.C.S., 93 Talbot-street, Dublin.

† Speedy, Albert O., L.R.C.P. Ed., Medical Officer No. 3 Dispensary District, North Dublin Union, 28 North Frederick-street, Dublin.

1900 Tennant, Elizabeth A., L.R.C.P. & S., 15 Harrington-street.

1895 Turner, David, L.R.C.P. & S., late Resident Medical Officer Royal Hospital for Incurables, 68 Grosvenor-road, Rathmines.

1902 Walsh, James A., L.R.C.P. & S. Edin., 30 Westmoreland-street.

1896 Wayland, R. S., L.R.C.P. & S., 54 South Richmond-street, Dublin.

1902 Wigham, Joseph T., Albany House, Monkstown, Co. Dublin.

1887 Wynne, Geo. Nesbitt, M.D., M.Ch., 31 Harcourt-street, Dublin.

STUDENT ASSOCIATES.

Ashe, James, Adelaide Hospital.

Baker, Lily A., Medical School, Cecilia-street.

Becker, H. A., 5 St. Kevin's-parade.

Boxwell William, 25 Lower Mount-street.

Charles, A., 8 Grantham-street.

Clarke, Miss, 10 Granby-row.

Connolly, James G., 50 Lower Mount-street.

DILLON, J. A., St. Vincent's Hospital.

FOLEY, CORNELIUS, 11 Stamer-street.

HARGREAVE, MISS, 8 Upper Mount-street.
HAYES, MARIE E., Medical School, Cecilia-street.

MURPHY, RICHARD V., 18 Harcourt-street.

O'REILLY, ALFRED, 9 Great Denmark-street.

WOOLCOMBE, ROBERT LLOYD, LL.D., 14 Waterloo-road.

ZIERROGEL, J. P., 46 Rutland-square.

RULES.

1. The name shall be, "ROYAL ACADEMY OF MEDICINE IN IRELAND." (1887.)

Constitution.

2. The Academy shall consist of Fellows, Honorary Fellows, Members, and Student Associates.

Management.

3. The affairs shall be managed by a Council, consisting of the President, Ex-Presidents (1893), the six Presidents of Sections, the General Secretary and Treasurer, the Secretary for Foreign Correspondence, six Secretaries of Sections, and eight Councillors, being two representatives from the Medical, Surgical, Obstetrical, and Pathological Sectional Councils respectively.

Meetings.

4. The Meetings shall be General and Ordinary.

Publication of "Transactions."

5. The "Transactions" shall be published by the Council, subject to the provisions hereinafter contained.

Original Fellows and Members.

6. All the Members of the present Societies (Medical, Surgical, Obstetrical, and Pathological) shall be Original Fellows or Members, without entrance fee. on payment of the annual subscription on or before 31st December, 1882.[a]

Fellows.

7. Fellows of the Royal College of Physicians of Ireland, and of the Royal College of Surgeons in Ireland, shall be admitted, without ballot, on payment of the entrance fee and the subscription for the current year. All others, being Registered Medical Practitioners not directly or indirectly engaged in the sale of drugs, shall be proposed by two Fellows, and elected by ballot by the Council.

8. Candidates shall be proposed at one Meeting of the Council, and balloted for at the next—one black bean in four to reject.

8A. That all Rules referring to the admission of Fellows, Members, and Student Associates shall be interpreted as referring to Ladies as well as Gentlemen.

Privileges of Fellows.

9. Fellows only shall be eligible for office in the Academy. They shall have the privilege of attending all Meetings of the Academy, of making Communications, and of voting and speaking at such meetings. They shall also receive a copy of the "Transactions."

[a] Those who have paid a Life Subscription to any of the above Societies will be admitted to the privilege of Fellows on payment of Member's subscription

10. These privileges shall not be exercised by any Fellow in arrear with his subscription.

Honorary Fellows.

11. Honorary Fellows, limited in number to 25, may be nominated by the Council, and elected, on motion at a General Meeting of the Academy by a majority of at least two-thirds of those present and voting.

Members.

12. Any Registered Medical Practitioner may be elected as a Member, the election to be conducted in the same manner as that of Fellows.

Privileges of Members.

13. Members shall have the privilege of attending the Ordinary Meetings of the Academy, of making Communications, and of taking part in debate. They can purchase the "Transactions" at cost price.

Student Associates.

14. Registered Medical Students may be elected Student Associates for the period of one year. The Subscription must be paid before election, and the Council may elect without notice of motion.

15. Student Associates shall have the privilege of attending the Ordinary Meetings of the Academy.

Annual Subscription.

16. Fellows shall pay £2 2s., and Members £1 1s. Student Associates shall pay 5s. The Subscription shall become due on the 1st of October in each year, and if the Subscription be not paid on or before the first Meeting in February, the defaulter shall cease to belong to the Academy, unless the delay shall be accounted for to the satisfaction of the Council. No Fellow shall vote at the Annual General Meeting who has not paid his subscription for the year. Medical Officers of the Army and Navy, and Registered Medical Practitioners not residing within 15 miles of Dublin, are eligible as Fellows of the Academy on payment of the entrance fee, and an annual Subscription of £1 1s.

Entrance Fee.

17. After admission of Original Fellows, all Fellows shall pay an entrance fee of £1 1s.

Council.

18. The Council shall meet on the first Wednesday in the month throughout the Session, or oftener should they see occasion—five to form a quorum.

19. Notice of all Extraordinary Meetings shall be transmitted by the Secretary to every Member of the Council. The President or any five Members of Council may call an Extraordinary Meeting of the Council. The Council shall determine questions by vote, or by division if so demanded, the President having a casting vote only. Any regulation of the Council shall have the force of a law, until submitted to the next General Meeting. The Council shall have the power of filling up any vacancies which may occur in the list of Officers of the Academy, except that of President, before the Annual General Meeting. If a vacancy in the office of President should occur, the General Council shall summon a Special General Meeting of the Academy to fill such vacancy. (1888.)

Sectional Councils.

20. There shall be six Sectional Councils elected by the Annual General Meeting in October, termed respectively—the Medical, the Surgical, the Obstetrical, and the Pathological, the State Medicine, and the Anatomical and Physiological Councils.

21. No Fellow shall be eligible as a candidate for election on more than two Sectional Councils, but no Fellow shall be eligible as a candidate for election on both the Medical and Surgical Sectional Councils. (1888.)

22. Each Sectional Council shall consist of the President of the Section and ten Members, one of whom shall act as Secretary to the Section ; except the State Medicine and Anatomical and Physiological Councils, which shall each consist of a President and six Members. (1888).

Meetings of Sectional Councils.

23. Each Sectional Council shall meet on a fixed day at least one week before the Ordinary Meeting of their Section, three to form a quorum.

Powers.

24. Each Sectional Council shall have the power of making any such arrangements as it thinks necessary to carry on the work of the Ordinary Meetings which are under its charge, provided that such arrangements do not interfere with the general laws of the Academy ; and any Rules laid down by such Council shall have the force of laws at the Ordinary Meetings under its charge, until submitted to the General Council.

25. Each Sectional Council shall have the power of filling up any vacancies that may occur among its Members until the Annual General Meeting.

Committee of Reference.

26. The Council shall appoint a Committee of Reference, to report upon morbid growths and other specimens exhibited before the Academy ; of this Committee the Exhibitor shall, for the occasion, be a Member.

Officers.

27. A President, to be elected by the Annual General Meeting in October, and to hold office for three years.

28. The Presidents of the Colleges of Physicians and Surgeons for the time being shall be the Presidents of the Medical and Surgical Sections. The Presidents of the other Sections shall be elected by the Fellows at the Annual General Meeting, and shall hold office for two years. (1888.)

29. One General Secretary and Treasurer to be elected at the Annual General Meeting.

30. It is expedient that a fixed salary (of one hundred guineas) shall be paid yearly to the General Secretary in consideration of the fact that the editing of the "Transactions" is part of his duties.

31. One Honorary Secretary for Foreign Correspondence to be elected at the Annual General Meeting. (1888.)

32. The Councillors for each Section to be elected at the Annual General Meeting. Each Sectional Council shall elect two Members to act on the

General Council, except in the case of the Sections of State Medicine and Anatomy and Physiology. (1888.)

33. Two Members in each Sectional Council shall retire annually, and be ineligible for re-election for one year, except in the Council of the Section of Anatomy and Physiology, in which only one shall retire (Oct., 1896).

34. Six Secretaries, one for each Section, to be appointed by the Sectional Councils.

35. At all elections after the year 1882, any Fellow desirous of nominating a candidate for election shall, at least one fortnight before the Annual General Meeting, forward an application to the General Secretary to enter the name of such Fellow on the list of candidates for office, provided that the Fellow so nominated shall have consented to act. (1891.)

36. That all elections shall be by ballot, but Fellows residing more than 15 miles from Dublin, and those incapacitated from attending by illness (to be certified), may record their votes by ballot papers, sent to the presiding officer in sealed envelopes provided for that purpose (Oct., 1896).

37. That in all elections to the Sectional Councils there shall be affixed to the name of each candidate the number of meetings of that particular Section for the Council for which he is now a candidate that he has attended. (1898).

Duties of Officers.

38. *The President* shall preside at the Annual and Special General Meetings and at General Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888.)

39. *The Presidents of Sections* shall preside at the Ordinary Meetings of the Academy, and shall also preside at the Sectional Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888).

40. *The General Secretary* shall attend all General Meetings of the Academy and General Council. He shall take minutes of such meetings, to be read at the following meeting.

41. He shall receive and have charge of all papers intended for publication in the "Transactions" of the Academy, after they have been handed over to him by the Secretaries of the several Sections.

42. He shall, on receiving notice from the Secretary of a Section, send out to all the Members notices of the title or titles of the paper or papers for the next Ordinary Meeting, with the name or names of the authors, and, so far as possible, of the subjects for Exhibition, with the names of the Exhibitors.

43. He shall arrange for the Exhibition of specimens and the reading of papers, which are forwarded to the Academy by those who are absent, or are not members.

44. The General Secretary and Treasurer shall receive all moneys, and lodge the same in bank to the account of the Academy, and all cheques shall be signed by the Treasurer and one other Councillor.

45. The Accounts shall be audited by two Fellows, not Members of Council, to be appointed by the President at some meeting previous to the Annual Meeting.

Duties of Secretaries of Sections.

46. To attend the Meetings of the Council of the Section and the Ordinary Meetings of the Academy, under the management of said Council, and to take minutes at such meetings, to be read at the next following meeting of that Section.

47. To keep such papers as the Sectional Councils recommend for publication, for the purpose of handing them over to the General Secretary.

48. To inform the Secretary of the Committee of Reference of any specimens referred to that Committee, and to transfer the specimens to that Secretary.

49. To give notice to the General Secretary, one week previously to the meeting, of the titles of papers for the evening, the names of the authors, and, so far as possible, the objects for Exhibition, with the names of Exhibitors, so that the General Secretary may inform the Members.

Meetings.

50. The Annual General Meeting to take place on the last Friday in October, for the election of Officers and Members of Council, and for the general business of the Academy.

51. Due notice of the meeting shall be given by the Secretary to all Members at least three weeks previously. (1891.)

52. No motion involving a change of these Rules shall be brought before this meeting except one week's notice thereof shall have been given by the Secretary to each Member.

53. The President may—and shall forthwith, on receiving a requisition signed by seven Fellows, at any time—on giving one week's notice, summon a Special General Meeting, for the consideration of particular business, the nature of which must be specified in the letter of summons convening the meeting, and at such meeting no other business can be transacted. In the event of the President being unable, from any cause, or declining, to summon a Special General Meeting of the Academy, it shall be in the power of the General Council to summon such meeting. (1888.)

Ordinary Meetings.

54. The communications to be submitted to the Ordinary Meetings shall be grouped under the following heads :—Medicine, Surgery, Pathology, Obstetrics, State Medicine, and Anatomy and Physiology ; and the conduct of such meetings shall be in the hands of the several Sectional Councils, each Sectional Council to have the management of the Ordinary Meeting in rotation, as arranged by the General Council. (1888.)

55. The Ordinary Meetings shall be held on every Friday evening, from the first Friday in November until the last Friday in May, inclusive, at eight o'clock, except during the Christmas and Easter recesses.

56. All Fellows, Members, and Student Associates attending the meetings, shall write their names in the attendance book.

57. Any Fellow or Member may introduce two Visitors by cards obtained from the Sectional Secretaries.

58. Officers of the Army or Navy Medical Departments shall, on presenting their cards, be admitted to the Ordinary Meetings of the Academy.

59. No communication shall exceed twenty minutes in its delivery, nor any speech thereon ten minutes, except by permission of the Chairman. No one shall speak twice upon the same communication, except the author, who has the right of reply.

60. A paper by any other than a Fellow or Member of the Academy shall not be read before the Academy unless the author of such a communication shall have obtained permission to do so from the Council of the Section before which the communication is proposed to be read. (1892.)

Ordinary Meetings.—Order of Business.

61. (1.) Chair to be taken at 8 30 p.m.

(2.) Chairman to read list of specimens, &c., exhibited by card, together with the names of the Exhibitors.

(3.) No Pathological Specimen shall be exhibited at any Section other than the Pathological and Obstetrical, except by card. This Exhibition shall not exclude any subsequent communication regarding it at the Pathological Section.

(4.) There shall be no Exhibition of Specimens by card in the Obstetrical or Pathological Sections.

(5.) Any member shall have liberty to exhibit any recent specimen at any of the meetings of the Obstetrical Section, provided it illustrates any question in gynæcology.

(6.) At the meetings of the Obstetrical Section recent specimens may be exhibited, and the President shall invite discussion thereon, provided that such exhibition of specimens or discussion, if any, thereon, must terminate at 9 o'clock, p.m., but that, if necessary, they may be resumed after the papers for the evening have been read and discussed.

(7.) Chairman to ask if any member has any observations to make or motion to propose relative to any living specimen on the List of Exhibition.

(8.) Chairman to call upon the author of the first paper on the list to read his paper.

(9.) Chairman to call upon members to discuss the paper, or, at his discretion, to take any other paper or papers on the list relating to the subject, and have the discussion subsequently on all such papers collectively.

(10.) When the last paper has been discussed, the Chairman to ask if any member desires to speak upon any of the specimens exhibited by card.

(11.) After the discussion upon any specimen, the Exhibitor has the right of reply.

Regulations regarding the Exhibition of Specimens by Card.

62. (1.) Any member may exhibit by card at any Ordinary Meeting, except at the meeting of the Pathological and Obstetrical Sections. At the meetings of the Pathological all specimens must be presented and described *viva voce*, and debate may be invited hereon.

(2.) Notice shall, if possible, be given to the General Secretary, or the Secretary of the Section, on or before the previous Ordinary Meeting.

(3.) Specimens must be in the room at 7 45 on the night of Exhibition.

(4.) Specimens for Exhibition by card shall be open for inspection at 8 p.m.

(5.) A card, containing all particulars for publication, shall be placed with the Specimen. Cards for this purpose are to be obtained from the Secretary.

(6.) The Exhibitor should be present, and he shall furnish further details if asked for.

(7.) Every Exhibitor shall submit the Specimen or Specimens on view to the Committee of Reference, if the meeting so decide.

Exhibition of Pathological Specimens.

63. No lengthened reference to treatment shall be allowed upon any Specimen, except by the express permission of the Chairman. Whenever it has been agreed that a Specimen exhibited at a Sectional Meeting of the Royal Academy of Medicine in Ireland shall be sent to the Reference Committee to report thereon as to its nature, the Exhibitor is to retain the custody of the specimen until he shall be summoned to a meeting of said Committee to be convened by its Secretary, on an early day, when he will attend and submit it for examination. (1889).

By-laws concerning "Transactions."

64. The "Transactions" shall consist of such Communications made to the Academy by or through Fellows or Members as may be deemed by the General Council suitable for publication; also, of discussions of importance or interest arising out of such Communications.

65. All Communications accepted by the Academy become the property of the Academy, but authors may also print their Communications, subsequent to the reading of the same before the Academy, in any publication in addition to the "Transactions." Papers shall be handed to the Secretary of the Section immediately after they have been read. (1891.)

66. The "Transactions" for the year shall be presented to all Fellows of the Academy who have paid their Annual Subscriptions.

67. The "Transactions" may be purchased by Members at cost price.

68. The Publication Committee of each Section shall meet not later than the Tuesday after each meeting of the Section, for the purpose of abstracting the proceedings—the abstract to be placed in the printer's hands on same evening, and forwarded to the editors of medical journals with the least possible delay. (1888.)

69. Contributors of papers may send their papers to the Academy printer early enough to allow of their being put in type before the meeting, provided the author be responsible for the cost of same should the General Council deem the communication not suitable for publication in the "Transactions."

70. That on the evening of the day of meeting of the Sectional Council, when the papers for the next meeting have been decided upon, a circular be sent to each contributor informing him :—

(1.) That he is expected to be ready or else take his place at the bottom of the list.

(2.) That he must have an abstract ready with his paper, otherwise he will be noted in the published proceedings in such form as the Publication Committee think fit.

71. The General Council is empowered to defray the expenses in whole or in part of any illustrations which it may consider advantageous to the elucidation of the papers published by the Academy.

72. An abstract (prepared by the author) of each communication made at the Academy, along with a report of the discussions thereon, shall be furnished to the editors of such medical journals as may desire to publish them, and the authors of such communications shall be empowered to publish their papers *in extenso* in any periodical or periodicals they may think fit, such communications also to appear in the "Transactions," provided the Council consider them worthy of insertion.

Expulsion of Fellow or Member.

73. Expulsion of a Fellow or Member can take place only at a General Meeting of the Academy, on the motion of the Council, if two-thirds of the Members present shall vote for the same by ballot. Of such ballot the Council must give at least fourteen days' notice in writing to every Fellow of the Academy.

New Laws.

74. New Laws, or alterations in existing Laws, can be proposed only at the Annual General Meeting. Any Fellow proposing such alteration shall give notice to the General Secretary at least ten days before the General Meeting in October.

REPORT.

THE General Council begs to report that the number of Fellows for the Session 1900–1901 was 227; of Members, 32; and of Student Associates, 10. The Fellows decreased by 4; the Members increased by 1; and the Student Associates decreased by 6.

The Council regrets that the overdraft on the bank has only been very slightly reduced during the past session, but hopes that by various economies to be effected during the present session a considerable reduction will be made before the next annual meeting.

In accordance with the resolution passed at the last general meeting, the General Council appointed a deputation to join one from the Committee of the Irish Division of the Medico-Psychological Association of Great Britain and Ireland in interviewing the Chief Secretary for Ireland, with the object of inducing him to assist in establishing a conjoint pathological laboratory for the Irish district lunatic asylums, by inserting a clause in some appropriate Act of Parliament to enable the district asylums to contribute from their funds to the support of a central laboratory. The Chief Secretary received the conjoint deputation most cordially, and expressed complete approval of the project of establishing such a laboratory as was suggested, similar to the institutions of the same character which are already in existence in England and Scotland. A permissive clause to enable the various asylums to contribute to the proposed laboratory would have his support, and he would be glad if his colleagues' consent were obtained to insert such a clause into a suitable Bill.

The Council is pleased to announce that the following clause received the Royal Assent last August:—

1 Edw. 7, Ch. 17, Section 5.

[*August 17th*, 1901.]

"The Committees for any two or more district lunatic asylums may, with the consent of the Councils of the counties affected, agree to unite in providing and maintaining a laboratory for pathological research in connection with insanity and nervous diseases, and may defray the expenses incurred in pursuance of an agreement under this section by contributions from the funds at their disposal for the maintenance of their respective asylums."

The subject of laboratories was dealt with again on a subsequent occasion on the initiative of the Dublin Branch of the British Medical Association. The President and Secretary of that branch wrote requesting the Council to consider the question of establishing a fully-equipped public bacteriological laboratory in Dublin. The Council thereupon passed the following resolution:—"That the Council approve and recommend the Royal Academy to approve the proposal to establish a fully-equipped public bacteriological laboratory in Dublin as closely as possible on the lines of the Jenner Institute in London, and that the Council are willing to appoint delegates to take part in any deputation on the subject to the Government that may be arranged." Delegates were subsequently appointed in accordance with the terms of the above resolution.

The attention of the Council was called to the delay in publishing the proceedings in the weekly papers, and after careful consideration the Council determined to dispense with the student reporters and make an arrangement with the proprietors of the *Medical Press and Circular* to report the proceedings and furnish copies of the reports corrected to the Secretary. The Council hopes that this arrangement

will prove more satisfactory to the Fellows in general than that which has been so unsatisfactory during several past sessions, and is happy to state that the new arrangement will be less expensive than the former one.

The Council resolved to join numerous other scientific bodies in presenting addresses to one of our Honorary Fellows, Professor Virchow, on the occasion of the eightieth anniversary of his birth, which occurred on the 12th instant. The Address has been kindly presented by our distinguished Honorary Fellow, Lord Lister, as our President was unable to be present in Berlin on that day.

The Council records with regret the losses the Academy has sustained by the deaths of the following Fellows:—A. K. M'Cutcheon, F. J. Quinlan, Charles M. Scott, R. Stafford Smith, J. Cooper Stawell.

General Treasurer's Report for the Session 1900–1901.

RECEIPTS.

	£	s.	d.
To Subscriptions and Entrance Fees	469	15	0
,, Dividends	19	8	6
,, Overdraft on Bank	73	10	6
Total	£562	14	0

EXPENDITURE.

	£	s.	d.
By Balance due to Bank	80	7	7
,, General Secretary	105	0	0
,, Printing, Stationery, and Postage	100	1	0
,, Transactions, Vol. XVII., and Illustrations	171	13	8
,, Royal College of Surgeons	15	15	0
,, Royal College of Physicians	15	15	0
,, Reporters	28	7	0
,, Servants	20	10	0
,, Groceries and Milk	19	4	3
,, Lantern	3	19	0
,, Interest on Account	2	1	6
Total	£562	14	0

We have examined the Accounts and Vouchers, and certify the same to be correct.

7th October, 1901.

EDWD. H. TAYLOR, F.R.C.S.
HENRY MOORE, F.R.C.S.

The Capital is invested in the names of Sir George Duffey, Sir William Thomson and Dr. Walter G. Smith.

Volume XIX. of the "Transactions" has been forwarded to the following:—

IRELAND:—

Medical Press	Dublin.
National Library	Do.
Royal College of Physicians	Do.
Royal College of Surgeons	Do.
Royal Irish Academy	Do.
Royal Dublin Society	Do.
Royal University	Do.
Trinity College	Do.
Queen's College	Belfast.
Do.	Cork.
Do.	Galway

ENGLAND:—

Birmingham Medical Review	Birmingham.
Medical Institute	Do.
Bristol Medico-Chirurgical Journal	Bristol.
University	Durham.
Liverpool Medico-Chirurgical Journal	Liverpool.
British Medical Journal	London.
Jenner Institute of Preventive Medicine	Do.
Journal of Obstetrics and Gynæcology, 8 Henrietta-street, Covent Garden, W.C.	Do.
King's College	Do.
Lancet	Do.
Library, British Medical Journal, 429 Strand	Do.
Medical Magazine	Do.
Medical Review (Med. & Surg. Review of Reviews)	Do.
Public Health, 19 Bloomfield Road, Maida Vale	Do.
Royal College of Physicians	Do.
Royal College of Surgeons	Do.
University	Do.
University College	Do
Victoria University	Manchester
Quarterly Medical Journal, 342 Glossop Road	Sheffield.

SCOTLAND:—

University	Aberdeen.
University College	Dundee.
Royal College of Physicians	Edinburgh
Royal College of Surgeons	Do.
University	Do.
Faculty of Physicians and Surgeons	Glasgow.
University	Do.
Do.	St. Andrews.

EUROPE:—

University	Amsterdam.
Naturforschende Gesellschaft	Basel.
University Library	Berlin.
University College	Bologna.
Académie Royale de Médecine de Belgique	Brussels.
L'Année Chirurgicale	Do.
Société Belge de Chirurgie	Do.

EUROPE—*con.*—

Université Libre	Brussels
University College	Christiania.
Académie de Médecine	Copenhagen.
La Grèce Medicale, Syra	Greece.
University College	Madrid.
Archivio di Ortopedia	Milan.
Académie de Médecine	Paris.
Archives Orientales	Do.
Revue de Chirurgie	Do.
University of Paris	Do.
Imperial University	St. Petersburg
Royal Carolinska Med. Chir. Institution	Stockholm.
University Library	Strassburg
Archivio Italiano di Otologia	Turin
Medical Society, Royal University	Upsala.
University	Vienna.
Naturforschende Gesellschaft, Dr. Rudolf Martin, Seefeldstrasse 119	Zurich.

AMERICA :—

Johns Hopkins University	Baltimore
Journal of Medical Research	Boston, Mass.
Brooklyn Medical Journal	Brooklyn.
Magill University	Montreal
Academy of Medicine, 17 West 43rd Street	New York.
New York Medical Journal, 66 West Broadway	Do.
University	Do.
Journal of Mental Pathology	Do.
Medical Brief	St. Louis, Mo.
American Journal of the Medical Sciences	Philadelphia.
Association of American Physicians	Do.
College of Physicians	Do.
University of Pennsylvania	Do.
University College	Quebec.
University Lavel	Do.
University of Toronto	Toronto.
Charlotte Medical Journal, Charlotte, N. C.	United States.
Library, Surg.-General's Office, Washington	Do.
Journal of Comparative Neurology, Denison University, Granville, Ohio	Do.
Medical Library Association, 19th and Stout Streets, Denver, Colorado	Do.

AUSTRALASIA :—

University	Adelaide.
Do.	Auckland.
Do.	Melbourne.
Inter-Colonial Medical Journal	Do.
University of Otago	New Zealand.
The Australasian Medical Gazette,	Sydney, N.S.W.
University of Sydney, care of Young J. Pentland, 38 West Smithfield, London, E.C.	Do.

ASIA :—

Bombay University	Bombay.
University	Calcutta.
Imperial University Library	Tokio, Japan.

BOSTON MEDICAL
DEC 3 1902
LIBRARY.

TRANSACTIONS

OF THE

ROYAL ACADEMY OF MEDICINE IN IRELAND.

SECTION OF MEDICINE.

A CASE OF DERMATITIS GANGRÆNOSA.

By J. MAGEE FINNY, M.D. Dubl., Ex-P.R.C.P.I.;
King's Professor of Practice of Medicine;
Clinical Physician to Sir Patrick Dun's Hospital.

[Read in the Section of Medicine, November 15, 1901.]

Case.—James B., aged two and three-quarter years, was admitted to Sir Patrick Dun's Hospital on May 4th, 1900, suffering from a number of punched-out circular sores on the face and hairy scalp, and a few similar though larger ulcers on the backs of the wrists and on the nates, and some small ones on the penis, scrotum, and pubes. The sores on admission were covered with a greenish yellow pus, and in one or two only was the pus raised above the edge of the ulcer. After the application of a creolin poultice, the floor of the sores was quite clean and of a deep red colour, with the edges sharply cut, of a similar red colour, which was strictly limited to its immediate neighbourhood. No bullæ were present at any time. The size of the sores varied from the size of a threepenny piece to half-a-crown, the greatest number being about the size of a shilling. Two on the back of the right hand—one over the wrist, and the other over the metacarpo-phalangeal joint of the index finger—were each about the size of a two-shilling piece, while a solitary ulcer over the right trochanter was still larger. Most of the ulcers were discrete, although a very narrow strip of healthy skin intervened, but on the forehead, above

the right eye, on the right cheek, and on the left eyelid two adjoining ulcers coalesced, forming an irregular gyrate outline made of two circles meeting. The eyelids were enormously swollen and adherent from the discharge which exuded from between them, and could not be opened so as to examine the eyes; the circular or oval ulcer on the left upper eyelid produced the very strange appearance depicted in a photograph taken at the time. The lips and margin of the alæ nasi were also sore and ulcerated, with considerable tumefaction. The ulcers did not seem to be very painful or very irritable, as, with the exception of those about the mouth, they were not scratched or rubbed by the little patient. The lower limbs were covered with an ill-defined rash, not unlike the staining of measles. The limbs were greatly emaciated, and the skin was rough and loose. The child, when admitted, was very weak and prostrate—not able to turn from side to side. He was greatly emaciated and had a cough; no physical signs of lung disease were, however, discoverable.

The treatment consisted in giving as much nourishment as could be taken, and of washing with creolin, applying boric acid poultices, dusting the sores with iodoform, and applying a weak ichthyol and lanoline ointment to the eyes.

No improvement followed, for although no more spots appeared, and no pus was discharged, there was no evidence of healing, while the skin surrounding the sores on the wrist and hip became of a deeper and more purplish colour.

The child died on May 9th.

The *post-mortem* examination was made by Professor O'Sullivan, F.T.C.D., and revealed general tuberculosis. The thymus gland was caseating; a caseous nodule existed in the apex of the right lung, and similar patches through the left; the bronchial and mesenteric glands were caseous. The tonsils were ulcerated and the cervical glands enlarged and firm. The ulcers on the skin were, in most instances, clean cut, circular, with smooth floor and sinuous edges; the wall in a few cases sloped inwards.

Inquiries as to the family and previous history of this remarkable case revealed that the child's parents were healthy. There was no suspicion of syphilis. There was no illness in the house or among the other children of his family. The patient had been under Dr. Wallace Beatty's care at the out-patient department of the Adelaide Hospital from April 12th, 1900, until admission

to my hospital. Dr. Beatty has most kindly supplied me with the notes made of the child's state when he first saw him. "It appeared to be a case of impetigo—a remarkable case. In the suprapubic region there are a number of closely-set, large pin-head sized pustules; also on the skin of penis and prepuce, wrists and backs of the hands." A note taken on May 3rd reads—"Extensive ulceration has set in about the face, the right hip and front of the left knee, consisting of deep, punched-out ulcers, round, with their base covered with pus." There were no bullæ present at any time.

As the eyes were very sore, Dr. Patrick Maxwell, to whom Dr. Beatty sent the child, examined them on April 12th at the National Eye and Ear Infirmary, Molesworth-street. He reports—"There is a diphtheritic-like membrane covering the whole of the left upper eyelid on its ocular surface, and a small corneal ulcer. The right eye exhibits a large corneal ulcer, and a similar membrane involves the edge of the lids." A subsequent note, on April 27th, shewed that the left cornea was practically gone, and the diphtheritic membrane was replaced by deep, punched-out ulcers. The great swelling of the lids prevented any lengthened exposure of the eyes for examination.

The foregoing case, then, seems to have been one of originally a pustular rash—impetigo—and when first seen the pustules were of small size, not larger than a large pin-head; that in three weeks' time these pustules were converted into deep and wide ulcers; and that, at the same time, the destructive process was similarly progressing in the eyelids and cornea—a veritable panophthalmitis.

The photographs—which were taken by my resident pupil, Mr. Gibbon FitzGibbon—give a true and graphic idea of the situation and relative sizes and shapes of the ulcers, but fail to convey the deep contrast which existed between the raw meat colour of the floor of the ulcers, the purplish red shade of their edges, and the light fair skin of the body.

It is an example of that rare disease which has been described under various names, and of which very few cases have been published. The earliest account of it was

by Dr. Whitley Stokes in Ireland in 1807, under the designation "White Blisters," "Eating Hives," or "Pemphigus Gangrænosus." His cases occurred in children from three months to four years of age. He drew a distinction between it and varicella, although he thought "swine-pock" (*V. Globata*) resembled it in its earlier stages. Jonathan Hutchinson (1882) gives a graphic and exhaustive description of it in *The Med. Chir. Trans.*, Vol. LXV., under the title "Varicella or Vaccinia Gangrænosa," his first case having appeared in *Brit. Med. Journal*, December, 1879. In 1880 Sir Wm. Stokes reported a similar case in THE DUBLIN JOURNAL OF MEDICAL SCIENCE, under the name of "Gangrenous Inflammation following Vaccination," or "Vaccinia Gangrænosa." Dr. Eustace Smith ("Diseases of Children," 1886, p. 49) refers to it "as a dangerous complication of varicella," while the name of "Rupia Escharotica" was applied to it by Fagge in "Guy's Hospital Reports." The most recent designation is given by Dr. Crocker ("Diseases of the Skin," 2nd edition, p. 330) as "Dermatitis Gangrænosa Infantum." This last appears to me, from a study of the reported cases, to be the best, as being wide and comprehensive, and for that reason I have adopted it as the title of my communication, for while it admits the close relationship between it and vaccination, on the one hand, and varicella on the other, it does not limit it to those diseases, as is done by the names adopted by Jonathan Hutchinson, Eustace Smith, and Stokes.

J. Hutchinson, in 1881, adduced the following grounds for connecting the gangrenous sores with varicella and with vaccinia after vaccination, and for pressing the view that it was a modified varicella, viz.:—(1) The co-existence of varicella at the time, and in other members of the patient's family; (2) the severe form does not happen to

delicate children more frequently than to robust; (3) the spots occur all together, and the tendency to cicatrise is alike simultaneous, and the cure is rapid; (4) there is constitutional disturbance.

According to Crocker, Mr. Hutchinson no longer holds to his original opinion, and the definition by Crocker of its being a gangrenous eruption following varicella or other pustular eruptions of children will, I consider, be generally accepted and adopted, as he writes—"Any eruption of isolated pustules may be the starting point of the ulcers." He records twenty-three cases, including fourteen cases of his own, of ages varying from three months to three years; the majority (14) were under one year old, 6 under two, and 3 under three years. The ulcerative process was generally, when not associated with vaccinia or varicella, in the lower half of the body, the buttocks and thighs. Sir John Wm. Moore in his "Eruptive and Continued Fevers," 1892, p. 130, speaks of "a remarkable case of the affection in a young lady, who for years suffered from urgent gastric symptoms, apparently of a neurotic origin."

In my case there was no evidence to associate it with either vaccination or varicella. The former had been performed two and a half years before, and there was no varicella in the patient's family or neighbourhood. Indeed, at that time of the year (May, 1900) chicken-pox was not prevalent in any part of Ireland, except in a distant part of County Donegal. This information the Registrar-General, Mr. R. C. Matheson, courteously gave me in reply to my inquiries on the subject. Moreover, Dr. Beatty, who saw the child very early in its illness, describes it as impetigo, attacking the penis and lower parts of the abdomen.

The pathology of the disease is very obscure. The

disease is a very rare one, and the opportunities of a full *post-mortem* examination still rarer, as it is not always fatal, and a considerable number of the cases are very mild and recover. It attacks mostly females (Crocker), and, as Hutchinson points out, the subjects of it are not the most feeble. It does not spread in families, nor does it seem to be contagious. Yet its whole characters would indicate a microbic infection in children under certain constitutional conditions. A *Bacillus pyocyaneus* was demonstrated in the ulcers by Ehlers of Copenhagen, but the same was found by Oetlinger in pemphigus and diphtheritic ulceration, and by Neumann in cutaneous hæmorrhages (Crocker). Dr. Eustace Smith (*ibid.*) "has no doubt it is connected with the curious tendency to spontaneous gangrene sometimes met with in children," and Osler (4th Edition of his book on "Practice of Medicine," 1901, p. 75) writes in the same strain—"In delicate children, particularly the tuberculous, gangrene (varicella escharotica) may occur about the vesicle (Hutchinson), or in other parts, as the scrotum."

When one reflects on the vast numbers of children there are who live under the most insanitary conditions, and how common pustular eruptions are among infants and young children—as evidenced by every dispensary and out-patient department of our city hospitals—it cannot but strike one that, in this dermatitis gangrænosa, we are face to face with a most rare and unaccountable condition. The presence of tubercular disease has been noted in very many of the fatal cases, as pointed out by Barlow; and of this constitutional state my little patient is an example, tubercle being found in the thymus gland and lungs. But it cannot, I think, be considered as cause and effect, having regard to the frequency of tuberculosis in children, on the one hand, and to the fact that many cases of gangrenous

dermatitis completely recover, and show no sign of tuberculosis before or after the attack.

The presence or not of tubercular disease must, however, have a very decided bearing upon prognosis and treatment, considering the tender age of the patients and the low state of their vitality, as evidenced by the presence of a pustular eruption.

Dr. Wallace Beatty never met with an identical case to the one described, though he met with a curious form of impetigo, in which the pustules were, though discrete, close. They were unhealthy looking, exuded a glairy secretion, and had a dark base. In a case of injury to the hand a rash resembling impetigo appeared, and was followed by ulceration.

Dr. Charles Moore stated that several years ago a number of such cases as those described by Dr. Finny had been treated in Cork-street Fever Hospital. From the appearance of the gangrenous sore they were called "burnt holes."

Dr. Walter Smith looks upon gangrene as a much less common occurrence than reasonably might be expected. Gangrene occurs under so many conditions—mechanical, thermal, and so forth. Mere arterial constriction is not sufficient to account for gangrene following the use of ergot. It is due to poisons from within, and poisons from without falling on suitable soil, hence the occurrence of gangrene in diabetic patients, hospital gangrene, acute gangrene in nervous diseases, acute bedsore of Charcot in hemiplegia, more common in left side hemiplegia, in syringomyelia. The ætiology of necrosis is as yet imperfectly understood.

Dr. L. Symes, whilst acting as registrar to Sir Thomas Barlow, saw two cases similar to that described; they occurred in girls between six and seven years of age. The ulcers gave out a thick, viscid, glycerine-like discharge. One case that died was tuberculous.

Dr. McWeeney found, some two years ago when making an autopsy on a patient who had died of typhoid, some of the gangrenous holes they had heard of; there were some half-dozen of the "burnt holes." He examined them, sectioned them, and made some cultivations, of which, on a future occasion, he hoped to

detail the results to the Academy. On the surface of the skin he found numerous cocci, but these cocci had nothing to do with the ulcer, which was due to a minute bacillus in the deeper tissue, which, by cultivation, gave a similar bacillus like to that of cancrum oris. He did not notice any bullæ on the subject he examined.

SIR JOHN W. MOORE said the case he embodied in his work on Continued Fevers was not due to varicella gangrænosa. He believed that the ætiology of the affection was to be found in bacterial thrombosis.

DR. BURGESS, who had known the patient of the late Sir W. Stokes, said there were two gluteal ulcers of large size, like to the cavity of a carbuncle.

DR. KNOTT drew attention to the frequency of "burnt holes" during the famine years. He looked upon the disease as closely related to "noma." The inflammation of the eyes in Dr. Finny's case he considered to be the outcome of nutritional changes.

DR. JAMES LITTLE thought that all the cases to which reference had been made could not be included under the same class as that of Dr. Finny's patient. The case was an extremely rare one, and he was sure they all felt grateful to Dr. Finny for bringing it before them. Some of them told of recoveries, but he thought it was too much to expect recovery in such a tuberculous patient.

DR. FINNY replied.

NOTES ON HALLUCINATIONS.

By CONOLLY NORMAN, F.R.C.P.I.;
Medical Superintendent, Richmond District Asylum.

[Read in the Section of Medicine, November 15, 1901.]

ALTHOUGH hallucinations are so common and so universally recognised an indication of insanity (Esquirol reckons, probably truly, if we count every stage of every case, that they occur in 80 per cent. of cases of mental alienation, and we all know that even with the general public there is no proof of aberration more convincing), yet there are many points connected with the study of hallucination which are worthy of more attention than they generally receive.

In any individual case in which hallucinations are a prominent symptom, one of our first inquiries will be whether they owe their special interest to an unusual extension over the entire sensory field or to an unusual distribution within some division of sense. There are not a few cases in which every sense and many subdivisions of senses, if this phrase is allowable, are attacked; others in which one or more stand out as being the only senses involved, or as being so pre-eminently engaged that the involvement of the other senses is dubious or is concealed.

In the present memoranda I propose to consider the points which arise in a particular case now under my observation. This case is not very complete with regard to extension, inasmuch as the engagement of two of the senses is somewhat doubtful, as will be shown hereafter. One of these is vision, and the other the sense of mental action. No one will deny the importance of the sense of vision in respect of our relation to our environment. The sense of mental action, on

the other hand, is one which has escaped the notice of the physiologist, because it is of no great importance in the normal state, when it rarely appears above the threshold of consciousness. The conditions under which we are conscious of mental action usually approach the abnormal. Thus, when we are very tired, when the attention is exhausted by prolonged occupation with one topic, or fatigued by the strain of endeavouring to fix the thoughts on one subject while another, perhaps reinforced by strong emotion, is constantly obtruding itself into the mind, we feel that our thoughts cannot be controlled, or we feel an intense sense of mental weariness. Perhaps distinct obsession is too absolutely pathological a condition to be classed together with normal phenomena, but the state analogous to obsession in which the sight of a train coming into a station, or the looking over a precipice produces a curious feeling of impulse to precipitate oneself is probably due to an interference with the sense of mental action.

Ordinarily, however, and in most matters, we use our minds without any distinct sense of mental action. Nevertheless, in paranoia where we see many of those dissections through disease, which often throw unexpected light upon normal function, the sense of mental action is often of great importance, since its morbid manifestations serve to reinforce delusions of malign and occult influence. Nothing is more common among patients of this class than the complaint that their thoughts are influenced, that they are compelled to think in certain ways, or are rendered incapable of thought or the like. It is often obvious that we are not dealing with a mere inference in these cases, but that the feeling (sense) of mental action (taking place in an abnormal way) is as distinct as the hallucination of any other sense.

The following is a brief abstract of the case on which I desire to comment on this occasion :—G. L., a single woman, who had formerly been a servant, whose age was sixty, was

admitted to the Richmond Asylum towards the end of October, 1901. There was absolutely no history further than that she had been four years in the workhouse, whence she came.

She was a well-nourished person, presenting no physical indications of disease. The skin of the face, backs of hands, and forearms was much tanned, as if from exposure to the weather. The left pupil was somewhat larger than the right. Both were normal in outline, and responded normally to light and accommodation. Vision good in both eyes.

The facial expression was intelligent and cheerful; she was tranquil and free from confusion; she conversed with intelligence. Replying to questions about her condition, she revealed numerous hallucinations, together with delusions of the common organised paranoiac type. Enumerated systematically, the following were the hallucinations found:—

General Sensibility.—Sharp pains all over the surface described as "pricks," "stabs of pain," "stitches," "darts," of pain, "like hot sparks from an anvil," together with more constant aching pains in the joints and muscles. Sometimes the sharp pain seems to be all over the surface, so that she feels as if surrounded by fire, as if her bed were on fire.

Temperature Sense.—Besides the feeling of burning or painful heat, a sense of warmth and flushes of sudden heat are shot over her, or sudden chills and sensations of icy cold.

Muscular Sense.—Extreme feeling of lassitude and weariness without cause. The limbs feel like lead, so that the patient is surprised that she can walk, so heavy are her legs, or lift her food to her mouth, so heavy are her arms.

Tactile Sensibility.—Here she complains of a peculiar sensation which I have not before found in cases of hallucination. Her hands from time to time feel dry and glossy. The dryness she describes is not a harsh dryness, but a smooth dryness. She states that it is as if her hands were polished, as if they were covered with a thin layer of dried gum, or

varnished. Again, she describes the surface as "glassy" or as "silky." This sensation she obtains by rubbing her finger tips together, or touching the fingers of one hand with those of the other.

Now, besides being most likely very rare, this sensation is of singular interest, as corresponding precisely to the sensation produced in patients who are taking belladonna. That the feeling in the latter case may be in part a nervous one is possible, but it is more likely that it is conditioned by the dryness of the skin arising from the suppression of perspiration produced by the drug. It is scarcely necessary to say that my patient has not taken belladonna. Neither does she present that dryness of the skin of the hands which would account for the sensation she describes. There is no reason to believe that she can have associated with a person presenting this silky dryness of the skin; all the probabilities are against suggestion of this sort.

Gustatory.—She tastes intensely acid tastes; also the taste of alum, a strongly astringent taste. These tastes are not stated to be confined to the back of the tongue, as one has occasionally found such gustatory hallucinations to be. The physiological writers state that the true tastes are but four—sourness, sweetness, saltness, bitterness. It appears to me that this list ought to be increased by the addition of two others—astringency and pungency. The sensation of astringency (in this case compared to alum) is certainly a taste. It has nothing to do with smell. Its connection with general sensibility is remote, if it can be said to exist at all, for the sensation that alum produces on the tongue seems absolutely of a different order from that produced by astringent and desiccating substances applied to the skin or mucous membrane elsewhere than in the mouth. I am not so clear as to pungency. Of course the savours which distinguish different pungent substances from each other are largely a

matter of smell, but with regard to the underlying pungency itself, it seems to somewhat closely resemble the smarting which similar substances produce when applied to the surface. Perhaps this sensation of pungency or acridity may be called the least differentiated branch of taste—may, as it were, furnish a connecting link between general sensibility and taste.

Olfactory.—She is worried with odours of fæces and such like filthy substances, or she smells the scent of fruit, more specifically of lemons.

Respiratory.—There are a series of sensations connected with respiration which I believe ought to be regarded as a separate sense. We are little conscious of them in the normal state, but they readily come prominently into consciousness when respiration is impeded, and disturbances in this region of sensibility are common in the insane. They are frequently associated with olfactory hallucinations, but they may exist alone. In the case before us the patient suffers from the feeling that she is, as she expresses it, being fumigated; her breath is caught. She has also "chucking" sensations in the throat, as if her wind-pipe were being forcibly dragged up.

Visceral Sensibility.—Sensation of movement in the abdomen and of torsion. "It is like as if a stick was thrust up through me and twisted round." Similar complaints are common among paranoiacs and hypochondriacs. They probably connote the appearance in consciousness of disturbances in regions commonly below its threshold.

Genital Sensibility.—An electric wire is thrust into the vagina, and causes much distress, by producing not only pain, but specific sensations.

Visual.—No visual hallucinations appear to exist now, and none have existed recently, but the patient says that four years ago, when, as she states, probably correctly, the annoyances began, she had a vision once of an angel with a drawn sword. This vision occurred in church. I am not sure how far this is

to be regarded as a true hallucination. As is so frequently the case, the patient seems to attribute something less of reality to it than she does to her auditory hallucinations. The latter she *hears*, the former she does not say she *saw*, but she *had a vision of*. It is interesting to note that while in some cases visual and auditory hallucinations coincide as to time and are often closely associated together, it very frequently occurs that hallucinations of vision cease comparatively early, while the auditory remain. In some cases we are told of visions, or what are apparently visual hallucinations, appearing but once, and intimately associated with the building up of a whole scheme of delusion. Thus in a case at present under my care the patient relates how a man whom he had never seen before, but whose appearance he describes, came into the room where patient was working one day. Nothing particular happened then, but the following night voices began to torment the patient, as well as all other kinds of sensory disturbances, and these he attributes to the unknown visitor, though he never saw him again, nor has he had any further visual images of persons. In such a case, however, unless one should have trustworthy contemporary evidence of the vision, it would seem probable that the sequence of the events is not as described by the patient, and that the vision was not an hallucination, but merely a delusion by reminiscence arising out of an endeavour to explain subsequent experiences.

Sense of Mental Action.—Besides the senses ordinarily recognised, disease at least seems to show, as we have said above, that there is a sense of mental or cerebral action. The very frequent complaints of paranoiacs that their thoughts are interfered with, that they are made stupid, that they are made say, do, and think things that they know to be wrong, and that they do not wish to do, do not present themselves in this case. The nearest approach is "they sometimes make me stupid with the tar-gas which they make me smell;" but as

she appeals to the fact that at such times the eyelids feel heavy, as a sign that she is stupefied, there is probably little true sense of interference with thought. What exists is rather an inference than a sensation.

Auditory Hallucinations.—She hears sounds of buzzing and whirring, rolling of wheels, and peculiar clattering, all of which she is confident are the sounds produced by the action of electric and magnetic machines. She also hears voices, which talk about her doings and her affairs, which abuse and threaten her, which are often horribly obscene and blasphemous. They talk also of the mode in which they torment her—"now we will put on the machine," "now we will give it to her," and the like. Further, she sometimes hears voices which remonstrate with the others, and speak in her favour.

The auditory hallucinations present many characters, which are frequent. They consist mostly of "voices," and the voices are as usual personal, abusive, indecent, and blasphemous. These characters are sufficiently accounted for by the "egocentric" suspicious nature of paranoiacs, and by the fact that the patient is a respectable, elderly woman. Besides the voices (verbal auditory hallucinations) she hears the sound of the machine that is working upon her, and she distinguishes the whirring of wheels, &c. (common auditory hallucinations).

It will be remembered that Séglas has divided auditory hallucinations into three classes:—*Elementary* (vague noises); *common* (sounds associated with definite objects); and *verbal* (where a voice is heard). These three orders, as he points out, indicate the engagement of physiologically separable functions, the hearing of noise, the recognition of sound, and the comprehension of speech. They are correlated to the conditions existing in another series of pathological states, where we have respectively cortical deafness, psychical deafness, and verbal deafness.

This patient also shows, among her auditory hallucinations,

the interesting phenomena of a voice which takes her part against those who abuse and defame her. This has been regarded as a *malum signum* and an indication of chronicity, and my experience coincides with the notion, though I fail, as I have pointed out elsewhere, to perfectly appreciate the theoretical explanation which has been given for its grave prognostic importance.

The points, however, of special interest are that the patient is only conscious of hearing sounds of machinery, and the voices of her persecutors, &c., with the right ear, while she is in fact absolutely deaf of that ear. The voices, &c., seem to her to proceed from a point about a foot to the right of her right ear. She was, when I first saw her, conscious of being somewhat deaf of her left ear, but did not recognise till I tested her hearing that she was deaf of the right. I gathered that the constant hearing of voices on the right side satisfied her of the soundness of her hearing on that side. Nevertheless I found that she could not hear a watch on the right side, even when touching her ear, nor when pressed against the skull. Being anxious to obtain a skilled opinion about the aural condition, I sent the patient to the well-known specialist, Dr. R. H. Woods, who very kindly examined her for me and courteously wrote to me as follows :—

"In the left ear there was no cerumen, the drum was slightly anæmic, but otherwise normal in appearance. The hearing distance with a watch was $\frac{1}{4}$; Rinne's test was $\frac{15}{25}$ normal. The tuning-fork placed on the vertex was heard only in the left ear. The right ear was plugged with cerumen; the drum normal in appearance, but would probably look a little anæmic if sufficient time elapsed after syringing. The hearing distance of a watch was lost; Rinne's test was $\frac{0}{25}$. There was no Eustachian obstruction in either ear. The conclusion, therefore, that I draw is that she is suffering from either auditory or labyrinthine deafness in her right ear, the hearing in the left being very fair."

The association of hallucinations of hearing with deafness has long been observed. It was noted by Calmeil some sixty years ago. Brierre de Boismont repeats the observation in his book on hallucinations. Ball more recently goes so far as to mention deafness as a cause of hallucinations of hearing. Savage endeavours to account for the association through the tendency to suspicion that naturally seems to spring up in people who have grown deaf. It is apparently intelligible that the irritation produced by a growing defect, the liability to think that that conversation which is not heard relates to oneself, and the constant straining of the attention in an effort to hear should combine to bring about hallucination. To accept this it is not at all necessary to refer to the old psychic theory of hallucination. It is an equally plausible doctrine if we accept, with, no doubt, the majority of modern thinkers, the theory of Tamburini. However explained, the association is one that is quite familiar to most alienists, though it does not appear to have attracted much attention among otologists. It has been suggested that tinnitus, the noises arising from cerumen, &c., may give rise in some cases to auditory hallucination by the transitional path of delusive interpretation, but against this notion it may be argued that in the most familiar examples of delusive interpretation there is little that is analogous to the conversion of a vague sound arising in the ear into a distinct verbal hallucination. Besides, in my experience, it has certainly not been with cases where there was tinnitus, &c., that hallucinations were markedly associated, but with cases of complete deafness.

Unilateral hallucinations, either occurring alone or occurring in cases where other hallucinations existed, have been occasionally described. I think they are rare, though Dagonet may be right in saying they are often overlooked. Ball, and subsequently Régis, wrote accounts of a case of unilateral auditory hallucinations coinciding with otitis media of the

same side. Mabille has described a case in which a melancholic woman suffered from right auditory hallucinations and was found to have a foreign body in the right external auditory canal. When the foreign body was removed the hallucinations ceased, but the patient remained melancholic. Féré has recorded a case of unilateral hallucination of hearing associated with herpes in the trigeminal region. In such cases peripheral influences seem undoubtedly to have some share in bringing about hallucination. How they act it is not easy to see. Raggi, some years ago, described two cases in which it is difficult to find a common explanation. In one, an elderly drunkard, unaffected with any discoverable ear disease, there was unilateral hallucination of hearing and bilateral of vision. In another, an old woman, there was visual hallucination confined to the right side, the right eye being affected with cataract. After cataract operation the hallucinations disappeared, but recurred shortly afterwards in a worse form than before.

The suggestion that functional disease is more liable to appear in a centre thrown out of gear by the absence of the normal stimulation might be plausible in some cases of auditory hallucination in deafness, whether unilateral or bilateral, but it does not seem to meet certain other experiences. Thus v. Gräfe's case points rather to peripheral irritation. Here a middle-aged man, who had lost the sight of both eyes apparently through panophthalmitis, developed visual hallucinations. Both eyeballs were atrophied and contained calcareous deposits. Neurotomy was performed, and the hallucinations at once disappeared. It does not seem that the patient had other hallucinations, but he would appear to have accepted the truth of the visual hallucinations while they existed.

It is to be observed that in the case which I have endeavoured to describe, none of the hallucinations are unilateral

save those of hearing. Dismissing the doubtful visual hallucinations, and assuming that the auditory took the lead in time, we are on the horns of a curious dilemma. If peripheral irritation or injury was an important element in producing unilateral auditory hallucinations, why should bilateral hallucinations of many other senses appear? On the other hand, with a strong tendency to hallucination of all the senses, why do auditory hallucinations, so common in those that hear and in the deaf, only appear in this case on the side which is deaf?

As I have mentioned, the delusions existing in my case are quite of the classical type. The patient does not know (but suspects that I know) who are her persecutors. She talks of "this system of annoyance and defamation;" dates events from the time when "they began to practise upon me;" believes that the annoyance and "practice" are carried out by means of electricity, magnetism, and "mesmericks." She pities the officers of the Asylum who are unable to control the "practice" to which she is subjected, and she describes their personal eccentricities with some astuteness, and a marked absence of favourable prejudice.

DR. DAWSON desired to hear from Dr. Norman if the hearing was lost before or after the auditory hallucinations commenced. The delusive interpretations of the senses was one of the most frequent phenomena of insanity. One of his patients, hearing a railway whistle, answered as if the sound were a voice. Dr. Norman's case was peculiarly interesting from the number of special senses implicated, and the fact that the auditory hallucinations were unilateral. In a case of early general paralysis in a patient he examined the delusive interpretation of the visual sense was well marked. At first, as the cornea became clouded, the patient saw moss, finally devils, monkeys, and ultimately declared that a hospital had been built at the back of his eyes to blind him.

DR. WALTER SMITH would like to know if auditory hallucina-

tions were not the most commonly met with. Special sense hallucinations following the toxic action of certain drugs are deeply interesting in this connection; the visual hallucinations of acute alcoholism, and the auditory hallucinations that occur so early in cocaïn poisoning, are examples known to all.

Dr. Bewley, referring to auditory hallucinations, told of a deaf patient who heard voices upbraiding him for crimes committed in youth. Ignorance is a fruitful source of misinterpretation. Children are afraid of darkness. The insane hallucinations often arise from attempts to interpret sounds that the sane ignore.

Dr. Norman replied.

HEMICHOREA AND PAROTITIS, COMPLICATING A CASE OF DIABETES.

By GEORGE PEACOCKE, M.D., F.R.C.P.I.;
Assistant Physician, Adelaide Hospital, Dublin.

[Read in the Section of Medicine, December 13, 1901.]

On the 29th of April, 1901, a man, aged sixty-four years, was admitted to the Adelaide Hospital under my care. He stated that his present illness began about two months previously with loss of appetite, great thirst, and increased flow of urine. He had also lost about five stone in weight during this period. Diabetes was suspected as the cause of his trouble, and an examination of the urine confirmed the diagnosis.

Quantitative analysis of the urine by Fehling's Solution showed on the 2nd of May 2·7 oz. of sugar per diem—the amount of urine passed being 89 oz. A subsequent analysis gave 0·9 oz. of sugar per diem, the amount of urine passed being 100 oz.

From the outset he seemed an unfavourable case. Drowsiness, at times almost approaching coma, was a marked symptom throughout his illness, and he died on the 28th of May, just four weeks after admission to hospital.

On the 4th of May it was noticed that his left arm and leg were in almost constant movement. These movements were choreiform in character, irregular and purposeless. Their severity altered at different times—emotion always made them worse. So severe did they become that it was practically impossible without constant watching to keep the clothes on his bed, and an acute eczema of the legs

resulted, mainly, I think, from the constant friction of one limb against the other. By a strong effort of will he was able to control these movements for a few minutes, but they soon returned again. They ceased during sleep. I first tried chloral, bromide of potassium, and tincture of hyocyamus without any effect, then hypodermics of hyoscin with a similar result.

On the 8th of May I gave 10 minim doses of liq. arsenicalis every eighth hour, and that night he had 20 grs. of trional, partly to procure sleep, but also in the hope that it would have a directly beneficial effect on the chorea.

The following day there was a decided improvement in his condition. The arsenic was continued, and he was given trional every night. The movements ceased entirely on the 13th of May. Whether this result was due to the arsenic or to the trional is open to question. The value of arsenic in the treatment of chorea is well known. Trional has as yet been seldom employed.

In the *British Medical Journal* of November 2nd, 1901, Dr. Meade records a case of acute chorea in a lady, aged twenty-five, who was six months pregnant. Her symptoms, which were severe, had resisted treatment by arsenic and bromides, when trional was given, 25 grs. at night and 15 grs. the following morning. Improvement rapidly followed, and by June 1st, or ten days after the first administration of the drug, her condition was so much better that only 12 grs. were given at bedtime, and this dose was discontinued a week later.

Last January a girl, aged eleven years, was admitted to the Adelaide Hospital under the care of one of my colleagues. She was suffering from acute chorea, and the ordinary sedative drugs were tried without success.

I advised the use of trional in 3 gr. doses every fourth hour. Improvement rapidly followed, and the drug was

discontinued a fortnight later, all the choreic symptoms having subsided.

In the *Medical Annual* for 1900 Dr. Adams has a short note on the use of sulphonal and trional in chorea. He considers the latter drug to be preferable, and is also of opinion that it is more useful than the drugs of a sedative nature that are usually employed. I have as yet had few opportunities of testing the value of trional in the treatment of chorea. My experience so far will, however, lead me to give it a further trial when a suitable case comes under my care.

The occurrence of chorea in a man over sixty is a rare event. The types of chorea known as Huntington's Chorea and Senile Chorea, which occur in patients past middle life, are characterised chiefly by their chronicity. The former is incurable and shows a strong hereditary tendency; recovery from the latter occasionally occurs after months or years—treatment having apparently little or no effect on the result.

The present case is evidently not an example of either of these forms. Can we regard it as pathologically related to Sydenham's Chorea? Little that is certain is at present known of the pathology of this affection. The embolic theory so long held, especially by English writers, is now rightly discarded, as there is no evidence pathologically to support it.

Many consider that it is merely a functional brain disorder, an instability of the nerve cells, and instance, in proof of this, those cases which occur as the immediate result of some sudden fright or emotion; whilst others account for the symptoms by the action of some toxic agent, the result either of an altered blood state or of some infective organism introduced into the system from without.

In favour of this view it has been urged that both rheumatism and endocarditis, which so commonly occur in association with chorea, have their origin in a common cause—some infectious agent—that cases are frequently met with in the course of the infectious fevers, notably scarlet fever according to Ross, in puerperal fever, and also after gonorrhœa; while Denne records a remarkable case which appeared after the use of iodoform in a fistula connected with caries of the cervical vertebræ, the symptoms of which ceased when the iodoform was suspended and returned on resumption of the treatment.

The poisons which circulate in the blood in diabetes can produce a profound effect upon the nervous system—the occurrence of coma, of peripheral neuritis, of toxic amaurosis are sufficiently striking examples. May they not, also, in other cases so act on the nerve cells controlling the motor apparatus as to cause symptoms such as occurred in the present case—symptoms that were at any rate clinically identical with those of chorea?

The second complication which occurred in the present case was parotitis.

On the 11th of May I first noticed a swelling over the parotid region on the right side. At first this seemed to give little trouble, but as it increased in size it became tender and gave rise to considerable pain. It was not until the 16th that there was any elevation of temperature, and then only a very slight one. During the last few days of the patient's life the temperature varied between 100° and 101·6°—the latter being the highest recorded.

When it appeared to me that a suppurative process was going on in the gland I asked Mr. Gordon to see the case with me, but owing to the patient's general condition, and also to the fact that no part was specially presenting, no surgical interference was attempted.

I can find no mention of a similar condition occurring in the course of diabetes, nor can I offer any explanation of its cause in the present case.

Apart from specific parotitis or mumps, inflammation of the parotid gland has been observed in the course of the infectious fevers, typhus, enteric, pneumonia, pyæmia, &c., and in connection with injury or disease of the abdomen or pelvis. Of 101 cases collected by Stephen Paget, and mentioned by Osler, 10 followed injury or disease of the urinary tract, 18 were due to injury or disease of the alimentary canal, and 23 were due to injury or disease of the abdominal wall, the peritoneum, or the pelvic cellular tissue. One gland only is usually attacked, and in 78 cases in which the termination is recorded 45 suppurated, and 33 resolved without suppuration.

That in many cases the origin is septic there can be little doubt, and when occurring in the course of pyæmia the condition is usually regarded as metastatic. In others it may possibly arise from irritants which proceed from the decomposition of matters retained in the mouth and gain access to the gland through Steno's duct, or as the result of dryness of the buccal mucous membrane leading to an obstructed state of Steno's duct with decomposition of the retained salivary secretion. "For such an opinion," says Hilton Fagge, "there seems to be no sufficient foundation."

Whether the presence of diabetes had any direct influence in the production of parotitis in the present case I must leave to others more competent to form an opinion than I am. Its relation to the choreic symptoms, though obscure, seems, perhaps, more intelligible. The occurrence of two unrecorded complications in the course of the disease is at any rate a matter of some curiosity, if not of considerable interest.

GLYCOSURIA AND INSANITY.

By W. R. DAWSON, M.D. (DUBL.), F.R.C.P.I.;
Medical Superintendent, Farnham House, Finglas;
Examiner in Mental Diseases, University of Dublin.

[Read in the Section of Medicine, December 13, 1901.]

NOWADAYS, when it is freely asserted that many, if not most, forms of mental disease are due to toxic influences, sometimes rather remote, the study of states undoubtedly toxic, in their relation to morbid psychical phenomena, has acquired an added interest. To such states belong certain cases of glycosuria associated with insanity, of which an unusual proportion, some seven in all, have come under my observation during the past fifteen months, and these I propose to discuss briefly here.

Disregarding minute distinctions, such cases may be said to come under one of two heads—viz., those in which morbid mental phenomena have arisen in the course of glycosuria, which presumably gave rise to them, and those in which glycosuria developed as a symptom during an attack of mental disease; the former class being rare, the latter fairly common. It is not, indeed, unusual to meet with some mental depression and irritability of temper in persons suffering from diabetes, but in few do these phenomena advance to actual insanity. That they do so sometimes, however, has long been recognised, the typical form of psychosis being a mental depression which, as Maudsley[a] says, "is inclined to be of a whining and wailing character, tedious and chronic, largely hypochondriacal in its complexion." Of this uncommon "diabetic insanity" the following case seems to be an example:—

[a] "Pathology of Mind," 1895, p. 113.

Case I.—Married woman, aged forty-three, admitted October 15th, 1900, suffering from simple melancholia. There was some neuropathic heredity. Though not robust, she had had no serious illnesses, but at the birth of her youngest child, about 3¼ years before, there had been severe hæmorrhage, from the results of which she suffered for a long time. Menstruation was always normal, and she had three children, all living. For about twenty years, however, there had been an excessive flow of urine, worse at times, and of late a sweet smell had been observed from it; but her doctor was not informed, and no urinary examination was made. In her younger days she was of a cheerful disposition, but about eighteen years back she had had an attack of mental depression, and ever since similar seizures about twice a year, which, however, have been increasing of late in severity, duration and frequency. On two previous occasions the attacks were very severe (*i.e.*, after her marriage, and from fatigue and anxiety in nursing a sick relative), but she had never been in an asylum. The character of the attacks was always the same—viz., simple melancholia, accompanied by failure of memory, somnolence, dulness of the special senses, and constipation. During her pregnancies and for about three months subsequently she was always mentally well,

In the spring of 1900, during one of her ordinary periods of depression, she undertook some work in connection with the death of a relative, and though better while it lasted she afterwards somewhat suddenly became depressed and physically weak. Change of scene failed to bring mental improvement, though physically she became unusually strong and well for her, still, however, suffering from constipation and some insomnia. As she was restless and miserable, spoke of suicide, and once struck a relative in a fit of excitement, she was seen by Dr. Revington, who advised her removal to an asylum.

She was a tall, spare, pale woman, with a neurotic type of face, and looking fully her age. Mentally, it soon became apparent that she suffered from a weak and fretful depression, persistent but not very acute, and shown by restlessness and querulousness, constant questions in a whining tone as to whether "nothing could be done to make her more contented," and complaints of failure of attention, loss of interest in life and of affection for her relatives, and the like. Her sleep was poor. Temperature sub-

normal. The pupils were found to react normally, and it may be said that the fundus oculi, when examined at a later date, showed no morbid appearances. The acuteness of the senses (except perhaps touch) was impaired. Both knee-reflexes were exaggerated. The heart was healthy, but blood-pressure was high (130 mm.). The lungs seemed healthy also, though there was some relative dulness of the right apex. The bowels tended to be constipated, but the appetite was large, and there was no special thirst. Micturition was frequent, and the urine on the day after admission was pale, sp. gr. 1018, and contained sugar. During the earlier part of her residence a sweetish smell was sometimes noticed from her breath. Treatment was at first merely tonic and directed to the relief of symptoms, especially constipation and insomnia, the latter of which yielded to moderate doses of equal parts of sulphonal and trional, which were given nightly, the dose being gradually lessened until after six or seven weeks it could be dispensed with altogether. At first an attempt was made to influence the mental state through the blood-pressure, by giving erythrol tetranitrate, but without success. Nevertheless, some slight improvement soon began to be perceptible, and in ten days she was looking better and had gained a little in weight. On November 25th the urine, which measured 40 ozs. for the twenty-four hours, contained a trifle over ½ oz. of sugar, and on the 30th she was put on antidiabetic diet, though carbohydrate food was not entirely stopped. Micturition had previously become less frequent, and mental improvement speedily manifested itself, the patient becoming less depressed, and losing her whining ways. On November 8th the quantity of urine had fallen to 26 ozs., and on the 9th it was 30 ozs., the amount of sugar present on the latter date being only ·09 oz. Six days later the patient rather suddenly brightened up and became cheerful and contented, and from this time (with the exception to be presently noted) she continued so, showing indeed, perhaps, a little reactionary elation. Her physical health was also good, but she lost weight considerably during the first fortnight under antidiabetic diet, after which she slowly regained it. On November 27th the twenty-four hours' urine measured 31 ozs., and contained an infinitesimal amount of sugar, which had completely disappeared by December 5th, though the quantity of urine had increased to 50 ozs. On December 9th the diet was somewhat relaxed, but

four days later the extra carbohydrate was reduced again, as there was a slight return of the feeling of weariness and also of the querulousness, while at the same time a good deal of sugar reappeared in the urine. The mental change was noted, however, before the diet was altered. By December 11th the patient was better again, while the amount of sugar had diminished to a mere trace, the quantity of urine being 33 ozs., and on the 13th the morning urine was found to contain no sugar, while after breakfast there was a trace, and at 5 30 p.m. a little more, the specific gravity rising from 1011 to 1026. On the 18th the urine measured 52 ozs., and was free from any appreciable amount of sugar, and the patient was physically well, and mentally bright and cheerful. Blood-pressure had fallen to 90 mm. It should be said, however, that some enlargement of the liver was detected on this day, but this had not previously been looked for. On this date she was discharged. During her residence menstruation was regular and normal. Since leaving she has persisted with the special diet, and I have recently been informed that she has steadily improved, and has gained in weight, while the urine, whenever examined, has been free from sugar. On three occasions there were signs of slight depression, but notwithstanding this her own opinion is that she has not been so well for twenty years.

We have here, therefore, a history of polyuria and recurrent melancholia running contemporaneously over many years, with general debility, the melancholia being of the type characteristic of diabetic insanity. In a severer mental attack sugar is found, and with the disappearance of the sugar under treatment the mental symptoms recover, returning slightly with recurrence of the glycosuria, to disappear again as it diminished. Lastly, persistence in the treatment has produced a continuance of physical and mental health such as the patient had not enjoyed for a long time, and this has lasted for nearly a year. It therefore seems probable that this is a case of very chronic diabetes giving rise to mental symptoms, although it must be admitted that some of the phenomena are unusual, such as the long duration (especially as the disease began in youth) and the absence of sterility; while

the non-examination of the urine previous to admission unfortunately precludes absolute certainty. Interesting points in the later attack are the small quantity of urine passed, and the blunting of the special senses, especially that of taste. The remaining cases may be more briefly dealt with, as they all probably belong to the second class, that in which the glycosuria is merely a symptom of the insanity, or rather of the disorder of the nervous system underlying it. In the first two cases, however, there appeared to be a definite relation between the glycosuria and the mental symptoms.

CASE II.—The first is that of a man, aged thirty-four, without known neuropathic heredity, who was admitted last May, with the following history. He had an attack of mental depression seven years before, since when he had worried a good deal about a scarcely noticeable facial deformity, imagining that people observed it and blamed him for causing it. A second attack of depression had followed influenza, and the present one developed after what appears to have been influenza also, about two months before admission. He manifested marked suicidal tendencies, which were the cause of his removal to an asylum, and the mental pain was acute at times, but his mind could be diverted from it by cheerful surroundings. His bodily health was good, and the organs sound. The pulse was 56, the blood-pressure high, tongue furred, bowels constipated. The knee-reflexes were increased. The urine was pale, of high specific gravity, and contained sugar, and he said that sometimes the quantity was large. Thirst was not complained of. The diagnosis was an attack of acute melancholia grafted on a mildly delusional state of mind, and the treatment was tonic, with attention to the bowels and sleep, substitution of saxin for sugar in his diet, and as much amusement and occupation as possible. The sugar disappeared from the urine in about a month, the depression coincidently dwindling. A fortnight later he was discharged, the melancholia being practically gone, though he still worried a little about his fancied deformity. Blood-pressure was normal. After leaving he went for a prolonged change to various places of resort, continuing to improve (though he soon dropped the treatment), and I heard three or four days

ago that he was doing his work, and was in excellent health. The urine when examined a few weeks after his discharge contained no sugar.

I am inclined to think that in this case both the mental symptoms and glycosuria were the result of the influenza, but that the latter may have had a prejudicial effect in increasing and keeping up the former.

Case III.—The next case was that of a man of seventy-seven, of splendid physique, and very sound for his age. Fourteen years before he had received a blow from a block on the back of his head, and six months later was seized with an attack of mental depression, accompanied by religious delusions, from which he recovered in about two months, remaining well mentally since. General health was good, but he had suffered from phlegmon of the leg about five years before, and the veins of both legs were thrombosed. He had been unusually quiet during the winter, but in the middle of February was suddenly seized with depression, accompanied, as before, by religious delusions. He was admitted about a month later, and was then acutely melancholic and delusional. Physically there was little abnormal, but the urine was of high specific gravity, and contained a trace of sugar. Blood-pressure high, pulse 84. The treatment, as before, was mainly general, but after a time sugar was withdrawn from the diet. After a few days he began to improve mentally, and he was discharged practically recovered in about six weeks, the sugar being then reduced to the least possible trace. He has since remained well.

It is just possible that in these cases the glycosuria may have preceded the mental symptoms, being caused in the former by toxic influence, in the latter by some slight injury to the cerebellum or medulla; but the data are quite insufficient to lend any colour to this theory, and the previous physical health of the patients is against it.

The remaining cases, four in number, only gave evidence of glycosuria on isolated occasions, and there is, therefore, no difficulty in classifying them. They are as follows;—

CASE IV.—A case of paranoia, with delusions of suspicion and persecution, in a man, aged thirty-two, who is morose, ill-tempered, and generally depressed. Albumen was found in the urine several times, but sugar on two occasions only—on May 27th and 30th last, at a time when his delusions were unusually rampant. He had also a prejudice against meat at this period, and was, therefore, living largely on carbohydrates. He always takes a good deal of fluid.

CASE V.—A case of subacute mania of nine months' standing in a girl of twenty-seven, with a tendency to stupor. Her urine reduced Fehling's solution on one occasion shortly after admission (in Dec., 1900), and there was a trace of sugar again ten days later. Slight traces of sugar were again detected in April and May, by which latter month the patient had practically recovered, but it had disappeared again before her discharge. The quantity, though always minute, increased somewhat after thyroid treatment, possibly owing to the milk diet given. [The treatment itself, however, may have been partly or wholly responsible.] She has remained well since leaving and gained in weight.

CASE VI.—An attack of acute mania, with stupor, and delusions of an unpleasant type, in a female paranoiac of eighty-three. A trace of albumin and some sugar were present on June 5th last. On the 8th the total quantity of urine was only 14½ ozs., sp. gr. 1030, and it contained albumen and a trace of sugar (4·6 gr. in all). The sugar had practically disappeared by June 13th, and was not again found. Blood-pressure was high, but fell with improvement, and she made a good recovery from the acute seizure in about four months.

CASE VII.—The last case was one of acute confusional insanity of about two and a half months' duration in a girl, aged twenty-nine, admitted November 1st. There was a trace of sugar on admission, and also of albumen, while on November 4th, when the quantity of urine was 24 ozs., sp. gr. 1022, the albumen had disappeared, but there was still a trace of sugar. On December 1 sugar had disappeared, and the urine was otherwise normal except in quantity, which was 80 ozs. There has been no return of the glycosuria, but the patient is still passing a large quantity of urine (81 ozs. on the 11th). Blood-pressure was high at first, but has

fallen considerably, and the patient is otherwise progressing favourably.

Taking all the cases together, it will be seen that their predominant characteristic was mental discomfort in varying degree and kind, except perhaps in one case (the fifth), where the glycosuria was so slight as to be negligible; and correspondingly the blood-pressure was high whenever taken during the acute stage. This association of glycosuria with melancholia was found by Dr. Leeper[a] also in three cases which were published by him recently, and corresponds with the more extended observations of Emil Raimann[b] and others, so that the connection must be essential. In cases of true diabetic insanity the form of the melancholia is that characteristic of cerebral anæmia, and if this be taken in conjunction with the atrophic character of the secondary morbid changes found in diabetic brains, it becomes clear that the mental symptoms are due to cerebral malnutrition, in whatever way this may be caused. It follows also from this that persistent glycosuria, or rather glycæmia, even if it be of secondary origin, is not unlikely to act injuriously on the nervous centres. As to the origin of the sugar in this second class of cases, it is highly probable that Raimann is right in considering it of alimentary origin, and due to a deficiency in the capacity of assimilating sugar; a deficiency which he has found to exist in the highest degree in melancholia, though also present in acute confusion and some other forms of insanity, and which is merely a part of the general disorder of metabolism in the insane.

In conclusion, it may be pointed out that glycosuria is not necessarily a symptom of bad prognostic import in insanity, as five out of my seven cases made good recoveries, and one

[a] "Journ. of Ment. Science," October, 1901, p. 758.

[b] "Wien. Klin. Woch.," No. 21, 1901 (B.M.J. Epitome, November 9th, 1901, p. 73).

more is in a fair way to do so, while the remaining case is for other reasons hopeless.

DR. WALTER G. SMITH would like to ask Dr. Dawson whether glycosuria was more common among the insane than among the sane. Savage had found it in not more than 3 per cent. of the patients at Bethlem Hospital; this differed from the experience of the Vienna physician, who found that 12 per cent. of the insane suffered from glycosuria. He would also like to know from Dr. Dawson if glycosuria gave rise to any special form of insanity. He was under the impression that it was associated more with melancholia than with exaltation. When glycosuria does occur in the insane is it characterised by any special symptom such as slight polyuria?

DR. LEEPER asked what is the relationship between glycosuria and insanity? Of the admissions under his care in Swift's Hospital 3 per cent. suffered from glycosuria. They present none of the classic symptoms of diabetes, except the presence of sugar. The Hindoos suffer greatly: every family has lost some member through diabetes. On the other hand, the phlegmatic Chinese escape: of 15,000 persons examined not one suffered from that disease.

DR. RICHARD A. HAYES also spoke.

DR. DAWSON, in reply, stated that he looked on glycosuria as uncommon in the insane; these were the first cases he had had. The more common forms were melancholia and dementia. In all his cases he found high blood-pressure. The special senses are seldom affected in diabetes mellitus.

ACUTE HÆMORRHAGIC PERICARDITIS WITH EXTREME FATTY DEGENERATION OF THE RIGHT VENTRICLE.

By J. J. BURGESS, F.R.C.S.;
Late Assistant Surgeon to the Richmond Hospital.

[Read in the Section of Medicine, December 13, 1901.]

The case from which I obtained the specimen (produced) was that of a labourer, aged thirty-five, out of employment, who was found dead in the street. From the evidence at the inquest he appeared never to have complained up to the time of the fatal seizure.

The body was that of a poorly nourished man, presenting no scars or other traces of ulceration; both lungs were emphysematous, with a large quantity of muco-pus in the bronchial tubes. There were no consolidated areas nor cicatrices to be observed.

The pericardium was distended; on opening which about a pint of fluid blood and clots poured out. The surface of the right ventricle was covered by recent lymph which could easily be detached, and presented the fluffy appearance which you can still see on the specimen. Before removing the heart I sought in vain for the source of the hæmorrhage, nor was I more successful afterwards.

On opening the heart it is noticed that the valves are healthy, but almost the entire anterior wall of the right ventricle is composed of fat. The absence of muscular fibre is very striking when you compare it with the fairly normal left ventricle. In the right ventricle there was a clot formed at time of death. The auricles presented nothing abnormal, and the coronary arteries were permeable.

Although neither myself nor Professor McWeeney, to whom I sent the specimen for examination, could find the source of the bleeding, I consider that the most probable solution is, that in an attack of acute pericarditis associated with a previously diseased heart, a hæmorrhage from some capillary vessels, although small in amount, was sufficient in this badly nourished man to cause a fatal paralysis by its pressure.

On consulting the literature on this subject we find hæmopericarditis is set up by three sets of causes, the most common being the rupture of an aneurysm or of the left ventricle itself into the pericardial cavity; the second, in the course of a pericarditis of a malignant or tubercular character, bloody serum is sometimes exuded into the sac; the third, the bleedings which may take place in purpura in this situation.

I am indebted to Professor McWeeney for the very complete examination which put malignant disease and tuberculosis out of the diagnosis.

The points of interest which make this case an extremely rare one are the hæmorrhage associated with the acute pericarditis and the extreme fatty degeneration limited to the right ventricle, a condition I cannot account for, nor do I see any cases of a similar nature published.

THE DIAGNOSIS OF SCARLATINA.

By J. MARSHALL DAY, M.D. Univ. Dubl.;
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[Read in the Section of Medicine, January 24, 1902.]

The diagnosis of scarlatina has now become a far more difficult matter than formerly, when the disease was of a severer and better marked type. From time to time cases are admitted to hospital in which the diagnosis is so very doubtful that a few remarks on the points on which to rely in coming to a decision may not be out of place.

The following may be related as a sample case:—

M. B., aged six years, was admitted to Cork-street Fever Hospital suffering from whooping-cough. On the seventh day after her admission her temperature went up to 100°; she vomited, and her pulse was 132. There was a redness on the pharynx, tonsils, and hard palate; there was a very slight browning of the flexures of the arms; no distinct rash could be observed on the body, except slight redness on the backs of the hands, the sides of the fingers, and at the flexures of the groins. The next day her temperature was 99°, pulse 128, and the child was apparently all right. The diagnosis then made was scarlatina simplex, but there was considerable doubt about the correctness of this opinion until it was confirmed by the onset of peeling on the sixteenth day, and on the twenty-second by distinct signs of nephritis, with blood and albumen in the urine.

The chief symptoms of scarlatina are—vomiting, sore throat, elevation of temperature, frequent pulse, and rash.

(1) Actual vomiting or a distinct feeling of nausea is nearly always present. In fact, I found this symptom prominent in over ninety per cent. of the cases admitted to Cork-street Fever Hospital. One must, however, discount it as a symptom in young people who are subject to attacks of nausea from various causes.

(2) Children so seldom complain of sore throat that unless one follows the golden rule of always looking at the throat when examining a child, this symptom may be overlooked. One may find in severe cases that the patient swallows quite well, but the converse also holds good, and a simple relaxed throat is often accompanied by troublesome dysphagia. In examining the throat, get the child well wrapped up and facing a good light, when, if scarlatina be present, the red punctiform appearance on the pharynx, soft palate, tonsils and hard palate, will be readily seen. The rash is not so distinctive on the inside of the cheeks as it is in the case of measles. In mild cases there is often a peculiar dull, yellowish whiteness of the hard palate to be seen on the second day. I believe, however, that the rash on the hard palate is diagnostic, especially in cases of scarlatina *sine eruptione*.

(3) At the commencement the temperature varies from 100° to 104°. It falls the next day, rising again in the evening, but not so high, and, following this course, generally becomes normal on the eighth to the tenth day. In mild cases it may become normal on the third day.

(4) The pulse-rate is more characteristic than the temperature, as even in the mildest cases it is over 120, generally 140 to 160, and we find that even after the temperature becomes normal the pulse-rate remains higher than normal; for instance, a mild case of scarlatina as M. B., aged six years, on the third day temperature was 99°, pulse 108, and on the fourth day the temperature was 98·6°, pulse 100.

(5) The rash in scarlatina is never seen on the end of the nose, or around the lips—*i.e.*, in the circumoral zone. It is almost invariably out before the third day. I only once saw it delayed until the third day, and that was in the case of a child who was admitted to the hospital suffer-

ing from convulsions, but after diligent packing the rash appeared and the convulsions ceased. It varies very much in degree. In the very mild cases there exists a fine punctiform rash on the tonsils, the hard and soft palates, and over the surface of the body where the skin is softest, such as the flexure aspect of the arms, the sides of the chest, the lowest part of the abdomen, the upper part of the thighs, and in the axilla. It can also be seen on the backs of the hands, the sides of the fingers, and on the dorsal aspect of the foot. When the elbow is flexed a browning along the folds of the skin is noted, and a similar condition is observed at Poupart's ligament, and also, but not so frequently, at the backs of the knees. This browning persists after the rash fades, and is present with red puncta on the lower limbs.

I shall now allude to a few other important points in relation to scarlatina before coming to the differential diagnosis.

Sweating is uncommon, but may be present in persons of rheumatic tendencies. The erythema, often seen in such cases, is generally of an evanescent nature, comes and goes, does not present the punctiform appearance, and is generally most intense on the chest.

The tongue in the early stages is coated, sometimes heavily, but later on the injected papillæ show through, and it becomes stripped, and then the true "strawberry" tongue, with the prominent fungiform papillæ, is well marked. One must especially distinguish cases where the tongue is covered with a slight fur, and the filiform papillæ are showing on the third or fourth day of the illness; a tongue with these appearances generally accompanies gastric catarrh.

When doubtful cases of scarlatina come under observation the course of examination I adopt is as follows:--

First, the question is asked, has the patient had scarlatina before? If the answer be in the affirmative, and the history of the attack be definite, I put scarlatina out of court, as I cannot call to mind definite, satisfactory, undoubted cases of a second attack of scarlatina accompanied by rash, although, of course, I admit, one may have scarlatina, *sine eruptione*, as a second attack. I then examine for (*a*) rash on the soft and hard palates, (*b*) browning of the flexures, (*c*) rash on the backs of the hands, or the sides of the fingers, (*d*) stripping of the tongue, and (*e*) reddish spots, smaller and more accuminate than rose spots, on the lower limbs. These, with a history of vomiting or nausea, are, in my opinion, sufficient to justify a physician in mentioning scarlatina and suggesting isolation.

With regard to the important question of isolation, one must, moreover, remember that mild cases of scarlatina often do not show definite signs of peeling until three weeks after the onset of the rash, and then the peeling may take the form of a polishing of the tips of the fingers, a roughness at the flexures of the joints, and of the chest walls, with, later on, a stripping of the feet. The milder the case the longer it takes for desquamation to make its appearance. The desquamation in scarlatina is peculiar. It may commence on the sixth day, or be delayed until the eighteenth or twenty-first day. It is not a definite proof of scarlatina, but when one finds the tips of the fingers polished, and desquamation on the trunk and extremities, which commenced in small pin-head points and has spread centrifugally, one may, as a rule, diagnosticate scarlatina.

Otorrhœa coming on without a definite cause is often the first symptom of scarlatina brought under one's notice, and when one meets such cases among children one should always remember scarlatina, and look out for peeling. Such cases are, I believe, very infectious. I may pass by acute

nephritis or dropsy as being a well-known sequela of scarlatina.

I will now briefly consider the diseases with which scarlatina may be confounded, and will endeavour to put them in the order of frequency of mistaken diagnosis—viz., Rötheln, measles, septicæmia, urticaria, erythema, rheumatic fever, meningitis, enteric fever, and, lastly, drug-rashes.

Rubella or Rötheln.—Vomiting is not an initial symptom in this disease, and only an occasional coincidence. The rash is usually the first sign of the disease; it appears all over the face and body, as reddish brown spots, slightly raised, brighter than in measles, but not so bright as in scarlatina, or it simulates the rash of the latter, without its punctiform appearance or the browning at the flexures. In Rötheln, as in scarlatina, the rash is present on the throat, similar in appearance to that on the trunk. The peeling of the tongue is absent. The glands in the post-sterno-mastoid and axillary areas are enlarged, and often also in the groins; still this point is of no diagnostic value in dealing with children who are the subjects of chronic enlargement of the lymphatic glands.

In Rötheln the temperature, as a rule, is only slightly elevated for the first twenty-four hours; still I do not think much reliance can be placed on the character of temperature as a point in diagnosis. The pulse is not frequent as in scarlatina. The patient does not feel ill in proportion to the amount and colour of the rash. Slight peeling has been seen after the rash has disappeared, but it is not similar to that which I have described as characteristic of scarlatina. The illness may be regarded as at an end when the rash has disappeared.

Measles.—In measles there are the catarrhal symptoms, the appearance of the rash on the fourth day on the face

and upper parts of the body, and next day on the lower limbs; raised, reddish brown, crescentic spots, coalescing as the rash develops. The appearance of the rash on the buccal mucous membrane is typical. In some cases of scarlatina there may be a rash on the arms and chest very like measles, but, on further examination, one generally finds it to be quite characteristic on the lower part of the body and the lower limbs.

Septicæmia, or septo-pyæmia, may be ushered in with a rash which it is often almost impossible to distinguish from that of scarlatina. As a rule, it is very intense on the arms and legs, and middle triangle of the body, is darker in colour, and does not present a punctiform appearance. Oftentimes one cannot distinguish the so-called scarlatina maligna from septicæmia.

Urticaria frequently presents a diffuse, red rash over the body and limbs, but at places one can detect the characteristic wheals, while the rash is very itchy, rapidly comes and disappears, and often reappears.

Erythema is a very rare disease, and presents a sudden blush, confined mostly to the body, is not often seen on the legs or the arms, seldom on the hands, and is evanescent. There are no throat symptoms, and no constitutional disturbance.

Rheumatic fever is a disease which may accompany scarlatina, or in which there may be a sore throat, sweating, reddish patches on the body and the arms, definite arthritis, or vague pains in the joints, as is especially the case when the disease occurs in childhood. The differential diagnosis in favour of rheumatic fever depends upon the absence of the circumoral and nasal white zone, of the rash on the hard palate, and upon the presence of stiffness of the muscles of the neck, enlargement of the tonsils, and arthritis.

Meningitis.—I have seen cases of the malignant type of scarlatina mistaken for meningitis, and when one considers the extremely infectious nature of the former disease it behoves us to be very careful. In scarlatina there are great restlessness, semi-consciousness, a purple or dark red appearance of the throat, with slight swelling, great dryness of the tongue, cold, pinched extremities, with high internal temperature, and a dark brown or petechial rash in patches on the arms, chest, and groins. A history of sudden onset, frequent vomiting, the absence of retraction of the head, or of the abdomen, and peculiar odours off the breath, with the rash, &c., as above, makes the diagnosis easy, if the two diseases be kept in mind.

Enteric fever is often ushered in with vomiting and a sore throat, accompanied by a rash on the chest and abdomen, and sometimes on the arms. The diagnosis rests on the patient being more ill than one would expect from the character of the rash, on the appearances of the throat, on the temperature being very high, on there being a foul, fæcal odour from the breath, and on the skin being moist and sweating. In a few days the abdomen becomes tympanitic, rose spots appear, and the diagnosis is confirmed. Still one must remember that there is a close relation between the two diseases; that they may be concurrent, that patients suffering from enteric fever are thereby rendered more liable to contract scarlatina, and, lastly, that in severe cases of scarlatina intestinal ulceration may be present similar to that in enteric fever.

I remember an interesting fact occurring some years ago in relation to these diseases. Enteric fever of a severe type broke out in a school near Dublin, and amongst the cases there was one girl who, during the third week of her illness from enteric, became covered with a red rash, chiefly confined to the trunk and thighs, and which very

closely simulated scarlatina. She peeled, but she did not convey scarlatina to any of the other patients in the ward. A year afterwards scarlatina broke out in the same school, and amongst those attacked this girl alone did not present a rash. In other words, she had scarlatina *sine eruptione.*

As regards the fourth disease (lately described by Dr. Clement Dukes), which we are accustomed to call Rötheln with scarlatiniform rash. During the year 1897 there were in Dublin epidemics of Rötheln, scarlatina, and measles concurrent, and although there was some difficulty at times in making a diagnosis we were fortunate in not having an outbreak of Rötheln in our scarlatina wards or *vice versa.*

In that epidemic we treated the so-called two forms of the disease in the same wards, and I did not see any cross infection, although we detained the cases in hospital from seventeen to twenty-one days.

This so-called fourth disease is diagnosticated from scarlatina by the absence of vomiting, the absence of rapid pulse, the presence of enlarged glands, the presence of rash all over the face and body on the first day of the disease, and completely covering the body on the second day. It consists of pink spots, large, but not so bright as scarlatina, with the absence of the browning and the erythema seen in the latter disease, its rapid subsidence, and the absence of sequela.

I may add that Rötheln is not always free from complications, as during the month of February, 1897, several children suffering from this disease died from pneumonia and other complications.

I am of opinion that scarlatina, being a fixed disease which changes its type slowly, is seldom, if ever, contracted twice. Measles is not so definite a disease as to severity or type, and may be contracted a second time.

Rötheln, I believe, is more frequently contracted a

second time, and the form of the disease may vary as regards the appearance of the rash.

In conclusion, I may lay down the following rules:—Never attempt to diagnosticate the disease from the character of a rash without seeing the whole of it; never attempt to make a diagnosis by artificial light, and, when in doubt, always act as if the more important disease were present, until its absence be certain.

Dr. Drury recognised the difficulty in diagnosis of scarlatina, and the importance of a correct diagnosis, as many unpleasant results may follow on a mistake. Long confinement to bed may of itself produce desquamation; if the person is accustomed to a daily bath you may get almost no desquamation. Polishing of the finger-nails may escape observation.

Dr. Pollock had observed two anomalous cases. In the first there were bad vomiting and sore throat, but no rash; on the tenth day he found some rash and desquamation. Six months afterwards the patient got a severe attack of scarlatina with otorrhœa, and died. The second case was marked by a sore throat, punctiform rash of palate, bleeding of mucous membrane of mouth, and inflammation of throat. On the seventh day the case proved to be one of gastric fever.

Dr. Richard A. Hayes found the difficulty of diagnosis of scarlatina most pronounced in adults. In mild cases there was no constitutional disturbance; the typical scarlatina throat may be absent. He based his diagnosis principally on the punctiform rash of the hard and soft palate and the rapid pulse. Temperature was of little diagnostic value; desquamation was not easy of recognition in every case. He thinks there is a certain relation between the extent of the rash and the amount of desquamation.

Dr. Craig was glad to hear such a practical paper. He isolates all doubtful cases. The author did not include the rash of influenza in his list; it is not infrequently followed by desquamation. Surgical scarlatina due to septic causes may be recognised by the absence of sore throat, and by the rash not extending to the face.

Dr. Doyle found the rash of belladonna to closely simulate scarlatina. He thinks that patients are sometimes sent out of fever hospitals without being medically examined before their

discharge, which is wrong. Such a case came under his notice. The child was dismissed on a Tuesday, and on the following Thursday had the scarlatina rash on its body.

DR. MORE O'FERRALL would like to know from Dr. Day the incubation period of scarlatina, and the exact cause of scarlatina? Does Dr. Day examine the blood of scarlatina patients? It is done in Vienna. He has observed that scarlatina conveyed by milk is always of a mild type. He had two cases, one of which was under conditions for a week in which it was impossible that infection could be conveyed to her, and yet she got scarlatina. In the second case the patient's environment scarcely admitted of infection for a full month, yet she took it. He had seen cases of an outbreak of scarlatina in a family, and found that the dark-haired persons were those who took the fever, the light haired-ones escaping. Dark-haired persons suffer more than fair-haired when attacked.

DR. HEARD thought desquamation may be deferred for a longer period than twenty-one days. He told of a series of cases in which desquamation was deferred for a month. Patients should be kept a longer time in hospital. He found a rash following on influenza to closely simulate scarlatina. In the "Fourth Disease" the skin peels in large patches.

DR. BYRNE found that Rötheln is met with only when scarlatina is epidemic.

DR. DAY, in reply, considered that there was a certain proportion between the severity of the attack and the rash. He was not inclined to extend the period of desquamation beyond twenty-one days. Hebrew children have a dark rash on the first day. He quite agreed with Dr. Hayes respecting adults. He did not know any surgical scarlatina. There may be septicæmia with a rash, or a surgical patient may contract scarlatina. No patient can leave hospital until examined by the physician. To find the exact cause of scarlatina he leaves to Dr. O'Ferrall's industry. The period of incubation, he thought, was generally known—it is not more than eight days. The mildness or otherwise of milk-conveyed scarlatina is dependent on the character of the epidemic. The infection is not so much due to the desquamation as was formerly believed. Any discharge, such as otorrhœa, may convey infection. He does not place reliance on the observation of nurses—he observes for himself. He looks on the "Fourth Disease" as non-existent, being no more than a form of Rötheln or rubella.

CASES ILLUSTRATING THE AID OF THE X-RAYS IN THE DIAGNOSIS OF INTRATHORACIC TUMOURS.

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The diagnosis of intrathoracic disease, it will be readily acknowledged by every practising and consulting physician, is at all times a matter of clinical acumen; and although it may be arrived at, in some cases, with comparative ease and by the ordinary methods of clinical examination, in other cases, and especially in those of suspected intrathoracic tumours, it is often one of the most difficult problems presented to the physician, and may be impossible by any clinical tests.

Of course there are instances of aneurysms of the arch of the aorta, or of malignant disease of the lungs, which can be recognised as such with ordinary care and observation, but, even then, while the presence of a new growth or an arterial dilatation is readily made out, the extent and size of the aneurysmal sac or the exact site of a cancer must be, at best, but a question of probability, or a bare guess. Then again, at times, an aneurysm may present no physical signs whatever to betray its presence, while, on the other hand, a mediastinal neoplasm may so closely simulate an aneurysm in its symptoms as to defy differentiation.

Any aid, therefore, which can help to clear up such difficulties

and remove such doubts, and which can change deductive evidence into demonstrable, must be gladly welcomed.

Such an aid, I believe, we may have in the X-rays, and I would like to illustrate this point in the following cases, which occurred in my practice during the year 1901.

Two are cases of aneurysm and one of malignant disease occurring within the chest.

In all the X-rays were a help more or less in removing doubts and in explaining anomalous symptoms; while in one it was the only means I had of detecting an aneurysm of the thoracic aorta.

And here I gladly acknowledge the valuable assistance I got from Dr. Edward Watson in the examination of these cases by means of both the screen and the radiogram.

I subjoin illustrations of the cases, and also, for the sake of comparison, one of a normal thorax. (Fig. A, Plate I.)

SARCOMA OF RIGHT LUNG.

CASE I.—C. B., aged thirty, a dressmaker, was admitted under my care to Sir Patrick Dun's Hospital, on the recommendation of Dr. Wright, Dalkey, on 29th February, 1901. Dr. Wright had treated her for hæmoptysis, and, recognising that her symptoms were of an unusual character, advised her being placed under observation and treatment in hospital.

Her history was indefinite, but it appeared that she had not felt well for three or four months, and had lost flesh. About six weeks ago she had some slight pains in her right side and had a cough, and had spat up a little blood. At the same time she noticed that her right breast was larger than the left, and that the right side of her chest appeared swollen. There is no history of any previous illness.

Present condition.—Very little cough or any distress, except breathlessness on exertion. She prefers to lie on her back, slightly raised. Temp. normal; pulse 100; respirations 24.

The patient appears well nourished. Her face is, as a rule, of a good colour, but sometimes shows a cyanotic hue, and there is a decided puffiness under the eyes, and both sides are swollen. The

PLATE I.

Fig. A.—Normal Thorax (seen from behind).

Fig. B.—Sarcoma of Right Lung (seen from the front).

jugulars are prominent, and the right supraclavicular fossa is swelled. The infraclavicular region is also puffed out with a firm semi-elastic infiltration of the skin or subcutaneous tissue, which does not pit on pressure.

The right side of the thorax is considerably larger than the left—by two inches—both above and below the mammæ. The right breast is heavy and large, and feels hard and inelastic, but not nodular, the swelling being in the areolar tissue rather than in the gland. The superficial veins are enlarged, and at the level of the diaphragm extend to the left side. The current of the stream is downwards.

The right arm measures ¾ inch more than the left.

PHYSICAL EXAMINATION.

Palpation.—The voice is so feeble that the presence of vocal fremitus could not be established; the feel of the whole side is that of induration, and thickening, so that the ribs cannot be readily made out.

Percussion.—Above the right clavicle a high-pitched note is obtainable, below the clavicle the whole of the front of the right chest is dull, and the dulness extends across to the left sternal margin. At the back, a high-pitched note is to be heard above a line drawn from the 9th dorsal spine to the acromion process, all below that line a flat non-resonant note. Change of position made no alteration in these signs.

Auscultation.—Over the affected side the breath sounds are practically annulled, vocal resonance being diminished below and rather increased above.

The *Heart* is normal in position and sounds. The *Pulse* is rapid, cir. 100, and equal in both radials. The *Urine* is normal.

As the diagnosis inclined to the existence of an intrathoracic growth involving the intercostal veins and superior cava, Dr. Edward J. Watson (the Officer in charge of the X-ray Department at the Hospital) took a skiagraph.

The result was not, however, satisfactory, as the whole side was more or less almost uniformly opaque, such as might be due to pleural effusion alone. Yet, on looking closely at the picture, an ill-defined mass, corresponding to the deeper shadow in the lower half, could be faintly outlined.

An exploratory puncture was made on 5th April, and some

clear, yellow fluid drawn off. It was then plain that there was, as expected, fluid in the pleura. Thoracocentesis was done on 8th April, when 72 oz. of fluid were obtained by syphon drainage; the first was yellow and clear serum, the latter third was blood-stained. The fluid did not coagulate on standing, and presented neither inflammatory corpuscles nor morbid cells.

The interest now lay in the physical signs. After the tapping the air was found to enter the upper part of the lung, and to a less extent the lower. The dull note disappeared over the whole back and axillary regions, and in front down to the fourth rib; below this it remained dull. This dulness might have been due to an encysted pleurisy which had not communicated with the posterior effusion, and had thus escaped drainage, or, as I strongly suspected, it was due to a neoplasm which by its pressure caused the œdema of the right thorax and the varicosity of the superficial veins. Besides, a pleural effusion alone could not explain the jugular and cervical distension.

For a couple of days after the tapping improvement was experienced, the swelling of the face and neck diminished, and the skin of the thorax and right breast was looser and moved more freely over the ribs. However, the dulness over the front of the chest never altered, and there was an absence of breath sounds over this dull area. On 13th the fluid was evidently reforming, as in addition to the dull area below the fourth rib in front, the dulness extended up again to the clavicle and to the level of the inferior angle of the scapula behind.

April 14th.—The patient weighs but 6 stone 11 lbs., having lost 3 lbs. in a fortnight. She has been up each day since the tapping of the 5th, feeling greatly relieved and thinks herself better, although from the returning and more persistent cyanosis of her face and lips, the increase in the size of the varicose veins over the thorax and abdomen, it is evident the intrathoracic pressure is not relieved.

April 23rd.—A second tapping was done and 62 oz. were removed; the fluid was straw-coloured with a few floculi of fibrin in it. It did not spontaneously coagulate.

On the day following Dr. Watson took another X-ray photograph, which demonstrated clearly the presence of a tumour in front of and to the right side of the vertebral column, extending from the level of the fourth rib behind down to a short distance

above the diaphragm, and occupying more than three-quarters of the lung space; and having regard to the persistent dulness in front, it presumably lies nearer the front than the back of the thorax. (Fig. B, Plate I.)

During the months of May and June, three weeks of which she spent at home, there was little change, but the fluid slowly reformed and the swelling in the breast, &c., returned. She was re-admitted on July 1st with an aggravation of all her symptoms, and, in addition, there was much insomnia, due to orthopnœa, and some difficulty in swallowing.

The physical signs of cutaneous œdema of eyelids, face, neck, and thorax, as well as those of the lungs and respiration, were much as before the first tapping; yet, in the hope that some relief might be obtained, she was tapped a third time, when 16 oz. were drawn off.

No relief to her distress and no change in the physical signs followed it. The only ease the patient got was from the hypodermics of morphia.

She left hospital a week later, and died at home on July 18th in an attack of dyspnœa, the second after her return.

Remarks.—There are some features in the foregoing case worthy of note.

The onset of the disease, which lasted about eight months, was insidious. It was not preceded by any operative proceeding for external cancer, nor by evidences of disease in other regions or organs. The intrathoracic tumour is therefore the primary disease, and although not positively proved owing to the impossibility of obtaining an autopsy, yet, considering the age of the patient, its nature in all probability was sarcomatous, and its origin in the connective tissue glands of the posterior mediastinum, from which its growth spread peripherally and latterly to the right, and invaded the pleura and lung.

Its pressure on the intercostal veins caused the œdema over the right half of the thorax, and it further involved the vena azygos and its tributary, the superior intercostal, as it

reached the superior vena cava. It is probable it pressed also upon the superior cava itself or the right innominate vein.

The cyanosis, the swelling of the supraclavicular fossæ, and the varicosity and large size of the superficial veins of the thorax and abdomen, in which the direction of the blood stream was downwards, could not well be otherwise explained.

ANEURYSM OF THE ARCH.

CASE II.—P. C., farmer, aged forty-two, married, was admitted to Sir Patrick Dun's Hospital, March 21, under my care, with an aneurysm of the thoracic aorta, on the recommendation of Dr. J. G. Gibbon, of Mullingar, Co. Westmeath.

Patient states he has been for many years in the habit of drinking a very large quantity of whiskey—up to 13 glasses a day; that about eighteen months ago he suffered from pain and a feeling of stiffness along the right side of the neck, and at the same time he noticed a lump at the upper part of the right side of the chest in front. He consulted a physician and was given medicine, with the result that the pain left him in three or four days, that for eight months subsequently he was free from trouble, and that then about three months ago, the pain began to trouble him again, being at times unbearable in the right shoulder. He saw the same physician again, and being no better, was treated by Dr. Gibbon, who gave him pot. iod. gr. xv. thrice daily with great relief. He also had morphia administered hypodermically for the pains. A month ago his cough became considerable, and he brought up each day about a teacupful of "phlegm," chiefly mucopurulent, and at times mixed with some dark-coloured clotted blood.

Dr. Gibbon reported "The sputum was free from tubercle bacilli."

Present condition.—Patient at present complains of pain more or less constant in the right shoulder and side of the neck, the pain varying in intensity and at times becoming very acute.

There is a tumour present in the upper part of the right chest, at the position of the sternal attachment of the clavicle and of the costal cartilages of the first and second ribs, and percussion dulness is present in this situation for an area of two inches diameter. Expansive pulsation is visible and palpable there also, and the aorta pulsates above the sternal notch. Tracheal tugging is

readily elicited, and a prolonged soft murmur, synchronous with the cardiac systole, is audible on auscultation. The trachea is pushed a little to the left side. Over the heart there is a loud systolic murmur audible, and most distinctly so towards the apex. The right radial pulse is normal, the left is absent, even the brachial pulse cannot be felt.

Respiratory System.—The inspiratory murmur in the upper part of the right lung is delayed, and then enters with a rush, though feeble, all over the right side. The air enters the left lung well above, but below, and also through the lower lobe, the sounds are masked by coarse crackling râles. Urine, sp. gr. 1030, reaction acid, no albumen.

Patient states that fourteen years ago he suffered from numbness and pain in his left hand and arm, that his hand used to get white and cold at intervals, and he lost complete power over it. On consulting a doctor he was told that his left radial pulse was much smaller than his right.

April 3rd.—Dr. Watson took a skiagraph of the thorax, which graphically depicts the aneurysm of the ascending transverse and descending portions of the arch. (Fig. C, Plate II.)

The patient was put on modified Tufnell's treatment, and he was given gr. xxx. iodide of potassium in the day, rest in the horizontal position being strictly enforced, and all stimulants were withdrawn.

April 12th.—Patient complained of pain at night over the region of the aneurysm; he, however, slept well, but on waking seemed to have some difficulty in breathing; the dyspnœa became much worse a few hours later, so that the patient could not maintain the recumbent posture, and could only get any relief by sitting up and leaning forward; stridor also ensued with a hacking, harsh cough.

For two days he seemed in imminent danger of suffocation, the only relief being given by medicated steam inhalations and the hypodermic use of morphia in repeated doses.

Dr. E. H. Bennett, our senior surgeon, saw him in consultation on the question of tracheotomy, but as the dyspnœa, &c., were not due to direct laryngeal œdema or pressure, but rather to deep-seated pressure on the bronchus, it was discarded as useless.

Fortunately the necessity did not arise, for in three days the

aneurysmal pressure had varied in its direction, and the urgent symptoms abated and were quite gone after seven days.

The postural treatment, having been so interrupted on 12th–16th, was given up. There was now no difficulty in breathing or swallowing. The aneurysm appears to have receded somewhat from the anterior chest wall, the pulsation above the clavicle being still very well marked, but below the clavicle it was much diminished.

May 3rd.—Allowed up to-day, slight pain complained of behind the right ear, and right side of the neck, which feels hotter than the left. The inner end of the right clavicle still pulsates with the beat of the aneurysm; there is no discolouration of the skin over the tumour.

Patient went out of hospital on May 10th. Temperature was never above normal; pulse ranged from 60–104.

Recent inquiries are to the effect that the patient was alive and about in December last, and was able to take exercise, and that he had not had any serious return of pain or dyspnœa. It is further reported that he has not continued the total abstinence which his seven weeks' residence in hospital had enforced and inculcated.

A still later report reached me to-day, March 7, 1902, from Dr. Gibbon, who writes: "I saw P. C. a short time ago. He is living in England and came over to sell his farm. He looked very well and tells me he has no pain. He had slight pain about Christmas time, but a few days' rest cured it."

Remarks.—In the foregoing case the interest is much enhanced by the location of the aneurysm by the X-rays.

While it was evident from the ordinary clinical tests that aneurysm of the first portion of the arch of the aorta existed, and pressed forward at the usual place and also at the sterno-clavicular joint, and that it extended into the transverse portion of the arch and bulged up into the neck, pushing the trachea to the left and engaging the opening of the left subclavian artery, it was not at all evident that the aneurysm was of the large size the skiagraph depicted, or that it extended quite as much to the left as to the right of the middle line,

or that it reached from the level of the second to the sixth rib on the left, and second to the fourth on the right side.

Thus by this clinical aid it was demonstrated that the aneurysm extends into the third stage, and by its pressure against the left bronchus, as I imagine it did, it produced the symptoms of the hæmoptysis, the mucopurulent expectoration and the congestion of the left lower lobe in the beginning of his illness, and induced the dangerous attack of "stridor from below" (Stokes), and the dyspnœa of the latter stages of his case while in hospital.

It is to be regretted that a more recent skiagraph could not be obtained to define the present size and shape of the aneurysm, for, as it is evident that improvement has taken place, and its pressure signs and symptoms have proportionately diminished, it is more than probable that the sac has contracted and become consolidated.

ANEURYSM OF DESCENDING AORTA.

Case III.—David M., aged fifty-four, admitted November 23, 1901, under my care. The patient is a flour miller, and had often to lift twenty-stone sacks on his shoulder.

He came to hospital complaining of pain localised in the left infraclavicular and supramammary regions. This pain was first noted about three weeks ago, while the patient was engaged in work of a fairly heavy character (putting belts on pulley wheels). His health has always been fairly good, but six years ago he was operated on for a left hydrocele, and four years ago he got a tumour in the right inguinal region, for which the right testicle had to be removed. On inquiry at the Adelaide Hospital this tumour was said to be of an adenomatous type.

Patient gives a definite history of having received an injury to the left testicle over two years ago, and as a result it became very painful and after some time enlarged. He states that he has had gonorrhœa, but never syphilis. He further states that he has lost 6lbs. in the last six weeks; his present weight is 8 st. 1½ lbs.

The pain in the chest is described as of a dragging character, shooting down into the left axilla and arm, and is accompanied by

a certain amount of numbness of the arm. The pain appears to get worse when the patient is walking about or working, and he has had to stand or sit down in the street or at work when thus affected, the rest relieving him only for the time being, and it has been bad enough to prevent his sleeping.

Full and complete physical examination of the thorax failed to give the slightest indication of any disease of heart and blood-vessels, lungs and pleura, and there are no evidences of pressure on the veins or nerves. The only alteration discoverable was that the left side of the thorax was half an inch smaller than the right, above and below the mamma. The cervical and supra-clavicular glands are not enlarged. There is no slowing or alteration in the volume of the left radial pulse, and the pupils are normal.

Under these negative signs I determined to seek the aid of the X-rays, and Dr. Watson examined the patient by the screen and made out a distinct area of shadow in the region of the descending aorta, and further noticed that it pulsated synchronously with the heart. He then took the skiagraph I exhibit. (Fig. D, Plate II.)

It will be observed that the shadow extends from the third to fifth ribs (seen from behind), and stretches out to the left side for two and a half inches from the vertebral mid-line at the level of the fourth rib.

The treatment, even before the X rays were called upon, was based on the suspicion of an aneurysm, and on the fact that staying in bed and lying down gave great relief to the pain. It consisted in keeping him in bed for four weeks and administering pot. iod. 5 gr. twice in the day and 10 gr. at bedtime. His diet was not rigidly restricted. Temperature had been sub-normal throughout.

For a week before leaving hospital, which he did on Jan. 17, 1902, he was free from all pains, and felt better than he had done for months before admission. One day he walked for two hours without any recurrence of pain. He had gained 5 lbs. while in hospital.

Remarks.—In this case there was a complete absence of all objective phenomena; and the only subjective symptom on which to lay stress was the existence of an ill-defined pain in the left thorax in front, referable to the third rib in the mammary line, and occasionally shooting out to the shoulder.

PLATE II.

Fig. C.—Aneurysm of the Arch (seen from behind).

Fig. D.—Aneurysm of Descending Aorta (seen from behind).

Now, though the presence of pain, as the *essential* symptom of aneurysm, should never be overlooked or made little of, it must be readily admitted that this symptom is not in, and by, itself sufficiently characteristic to justify a diagnosis of aneurysm. One is well aware that some patients, with a moral obliquity and a certain unworthy purpose, may, and do, make great stock out of these pains; but, on the other hand, when there is no desire or intention to deceive, cases have occurred which have been made little of by the patient and the doctor alike, and yet have ended fatally by the sudden bursting of an intrathoracic aneurysm. Under these circumstances the aid of the X-rays is incalculable, as it converts the possibility of an intrathoracic tumour being the cause of the pain into a certainty. This it did in my case, where it might be called a revelation; and it did more, for it told me that the tumour was a pulsating one expanding laterally at each cardiac beat. Of this particular feature Dr. Watson assures me he is as certain as that the heart itself moves with each ventricular systole and diastole. By the use of the screen it is more readily made out, and, indeed, the print of the photograph [exhibited] shows it as an indistinct and hazy halo surrounding the tumour at its left side.

As seven weeks have elapsed since David M. left hospital I thought the interest in his case would be enhanced by subsequent inquiry and examination.

Yesterday, March 6, 1902, I sent for him, and Dr. Watson took another skiagraph of his thorax, which I now exhibit. He also examined him by the screen. The tumour is as visible as before, with this difference, that it is larger and bulges out still further to the left side above the heart. In this situation the tumour is seen to pulsate with each cardiac systole.

Dr. Watson informs me that there is complete absence of all the usual physical signs of a tumour, in front or behind,

and that the patient has been able to resume his ordinary work since he left hospital on Jan. 17, 1902, and has complained very little of pain or distress.

In conclusion, I may point to the want of agreement between the symptoms and the presence of a pulsating tumour, on the one hand, and on the other, the variability of the symptoms and signs of intrathoracic pressure, as being two of the most remarkable features in the history of aneurysm, and most helpful in the differential diagnosis between aneurysm and cancer. These points are well brought out in the foregoing cases.

ON THE USE OF "X-RAYS" IN MEDICAL DIAGNOSIS.

By WILLIAM S. HAUGHTON, M.D.;
Surgeon to Steevens' Hospital;
University Demonstrator in Röntgen Photography.

[Read in the Section of Medicine, March 7, 1902].

During the past six years the X-ray examination of a considerable number of patients (some 1,900 odd) in hospital and private practice has brought home to me the conviction that while Surgery and Dentistry have claimed an ever-increasing amount of help from the Rays, Medicine, at any rate in this country, has not availed itself as fully as it might have done of this additional mode of diagnosis.

The reason for this may be twofold—a natural diffidence to adopt a new method of examination, whose utility was unproved, or neglect on the part of advocates of the process to call attention to its utility in medicine.

The first of these difficulties is now removed by the records of splendid and sterling work from French, German, and American centres;* and with regard to the second, I may state that some three years ago I had the honour of calling attention to its possible value in the Pathological Section of the Academy, and in a Presidential Address before the Dublin University Biological Association.

It is my object briefly to call attention to those applications in medicine which have been proved successful, only

* Many of the observations mentioned in this Paper as the result of my own "X-ray" experience have been made independently by other "X-ray" workers, an excellent account of which will be found in the "Röntgen Rays in Medical Work," by David Walsh, 3rd edition; "Practical 'X-ray' Work," by Addyman; and "The Roentgen Rays in Medicine and Surgery," by Williams.

detailing one or two illustrative cases amongst those whch have come under my own notice.

In pulmonary tuberculosis I need hardly call attention to the great value of an early diagnosis, placing, as it does, the physician in a much better position to prescribe treatment, and greatly increasing the patient's chances of recovery.

In this disease, whose great prevalence and high mortality are universally recognised, "X-rays" have rendered splendid service, and will, I am confident, come into very general use when their true value is justly estimated.

Two constant physical signs are present in this affection when examined by the Röntgen method—namely, *opacity*, which depends on the *extent* and *density* of *consolidation* in the lung, and *restricted movement* of the diaphragm on the affected side, depending on the *loss of elasticity* in the lung tissue.

Before detailing cases let me describe my method of conducting this examination. I may say at the start that the fluorescent screen is infinitely preferable to any photographic method, for these reasons—the cardiac movements disturb the lung tissue for a considerable area around, and though very short exposures may avoid the faults due to respiratory movements, the disturbance due to the heart considerably lessens the value of the examination. On the other hand, the method by screen examination occupies a much shorter time—a few seconds in some cases—and possesses the further advantage that with the eye one can actually *watch* the movements of the heart and diaphragm, as their contour and position change, and record them on a suitable surface, from which accurate measurements can be made.

I find most "X-ray" workers of experience agree with me in this opinion; and when *very delicate differences* in

shadow have to be estimated, as happens in very early cases of lung trouble, one can so graduate the "X-ray" light, while watching it on the screen, as to indicate a very slight opacity, which cannot be done in the photographic method.

To examine a chest, one merely places the patient with his back to the Röntgen lamp, which is placed at a fixed, known distance from the screen, and in a fixed relation to the anatomical structures in the thorax.

I find two feet from the lamp to the screen a convenient working distance, at the level of the ensiform cartilage, for observing the movements of heart and diaphragm.

It must here be pointed out that if the comparison between two different patients is to be of any use, the successive examinations must be conducted on what is known in experimental science as exactly similar conditions. Hence the necessity for adopting some such constant method as I have described.

If the patient is more comfortable sitting down the examination can be made so, but diaphragmatic movements are thus impeded; while if the recumbent position is essential for the safety of the case, a canvas stretcher permits the examination in the horizontal position. Having placed patient in one of these positions, a large screen is placed over chest, the light turned on, and observations are made of the position of the heart, and excursions of the diaphragm in quiet breathing. Then its level in forced inspiration and expiration is observed; and finally a close scrutiny is made of the relative transparency of the two lungs, and any isolated shadows due to patches of consolidation are searched for. During the course of this examination it is very necessary to vary the amount and quality of "X-ray" light, as I find slight differences of shadow may be overlooked in a light which is too strong.

To record the results of this examination I use one of two graphic methods. First, looking at shadow of heart and diaphragm on screen, with a dermographic pencil I trace the outline of each on the patient's skin, first in full inspiration, then in full expiration. Next, the position of any shadow due to consolidation is marked on skin. From these marks on skin a tracing is made on tracing paper (some of which were exhibited), noting position of suprasternal notch, ensiform cartilage, and nipples, or any special rib.

The other method of recording is to use a large sheet of celluloid, placed either on patient's skin or in front of screen, and on this celluloid the shadows are traced pre-

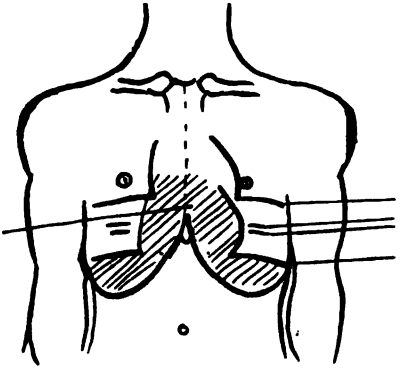

DIAGRAM 1.—NORMAL ATHLETE'S CHEST.

The highest line marks level of diaphragm—in forced expiration. The lowest line—in forced inspiration. The two intermediate lines—in quiet breathing. The central mass is shadow of heart in full expiration and inspiration. The excursion of diaphragm in this case in extreme movements was 3¼ inches; in quiet breathing, ½ inch.

cisely as in the first method. One advantage of the celluloid method is that a case can be examined and recorded without the removal of clothes—a point that is sometimes much appreciated by the patient.

"X-ray" examinations have proved most valuable in the following varieties of *Pulmonary Tuberculosis*:—

1. In the diagnosis of very early disease, when there are *no* physical signs, or where they are very doubtful. For instance, in a patient suffering from anæmia, digestive troubles, and a slight temperature; but with *no* cough or expectoration.

2. In a case with very slight physical signs.

3. In one with complications, such as bronchitis, pleurisy, emphysema, or pneumonia, masking the tuberculosis.

4. To confirm diagnosis.

5. To test lungs (*a*) where a known tubercular focus exists elsewhere; (*b*) or in cases with a bad family history, to allay fears on part of patient or relatives.

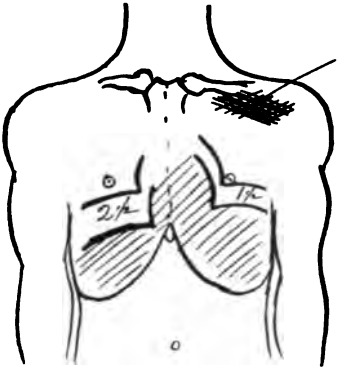

Diagram 2.—Phthisis.

The *apex* of left lung throws a shadow (shaded area), due to "consolidation." Excursion of diaphragm (extremes of full inspiration and expiration) on diseased side was 1½ inches, as against 2½ inches on the normal side of chest. The only physical sign in this patient was hæmoptysis. A few days after "X-Ray" examination tubercle bacilli were found in sputum.

In a very early case of consumption the following signs are found present in an X-ray examination:—

1. Slight opacity of one apex, or of that part of lung where disease is commencing.

As I have pointed out elsewhere, to detect this slight opacity, due to consolidation, requires sometimes a very considerable experience in X-ray screen examinations, and manipulative skill in adjusting the quality and quantity of X-ray light.

2. Restricted movement of diaphragm on the affected side, due to loss of elasticity in the lung tissue. This restriction of movement is most marked, as a rule, in the lower ranges.

3. In some cases, during deep inspiration, the heart is displaced towards affected side.

Later on in such a case, where the usual physical signs have become established, "X-rays" show an *increase* in the *opacity* and *size* of the shadow of the consolidated patch; and at same time the diaphragm's movements become more restricted on the affected side.

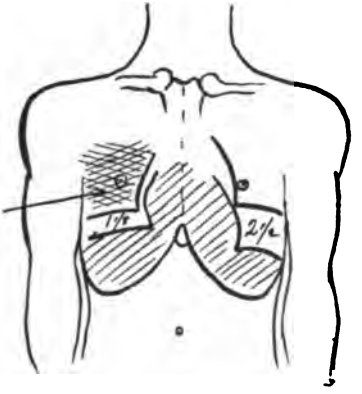

DIAGRAM 3.—ACUTE PNEUMONIA.

The right *lower lobe* is affected, and throws a shadow (shaded area), due to "consolidation." Note excursion of diaphragm restricted to 1½ inches on affected side, as against 2½ inches on sound side.

Very often in a case where one apex only is suspected, "X-rays" will demonstrate a patch of consolidation in the other apex.

We can easily see the important bearing of these observations on the treatment of a case of phthisis, especially when taken in conjunction with percussion and auscultation. The results of the usual methods of examination can be confirmed, and in some cases the presence of more extensive disease diagnosed.

In the course of treatment the precise extent and progress of the disease may be watched by "X-ray" examinations repeated at regular intervals.

The process of resolution in a patch of consolidation is marked by a diminution in the opacity and size of its "X-ray" shadow. What has been said of the value of this examination in the treatment of a case is, of course, equally important in giving a prognosis.

When phthisis is complicated by bronchitis the former condition is recognised by the patches of opacity.

When pleurisy is present it can be distinguished by signs to be mentioned later on. This is true, also, of such complications as emphysema and pneumonia.

In the diagnosis of acute pneumonia little doubt exists as a rule; but where the disease commences in the central portion of a lobe, much doubt may exist for a time.

The Röntgen method in pneumonia yields following signs:—

1. Dense opacity of part or whole of lobe, according to degree of affection.

2. Restriction of diaphragm on affected side, or sides.

3. Displacement of heart away from affected side, accompanied by dilatation.

In the after-treatment of a case of pneumonia, and more especially in forming a *prognosis* as to risks of secondary affections of the lung, I believe "X-rays" will be of the greatest service.

For a considerable time after the crisis in pneumonia—

some weeks—the affected lobe is found to be somewhat opaque, and the diaphragm's movements much impeded by the want of elasticity in the lung. If these signs (when other physical signs are absent) persist for a considerable time, as they sometimes do, the after-treatment of such a case would be necessarily more cautious and prolonged.

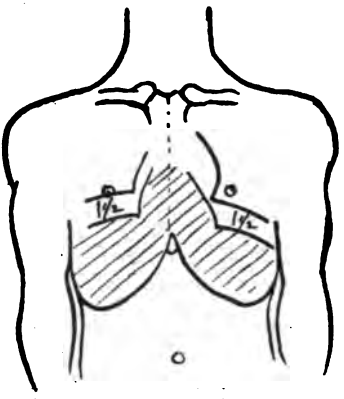

DIAGRAM 4.—LOBULAR PNEUMONIA.

Both sides of chest being affected equally, the excursions of diaphragm are equal, 1½ inches; but note that this 1½ inches is a "restricted" movement, as against the 2½ inches *normal* range in full expiration to full inspiration.

The complication of pleurisy in pneumonia also leaves behind it signs of restricted movement.

In pleurisy, when an effusion is present, the screen shows following signs:—

1. Contour of diaphragm is partly or wholly obscured—the pleuritic fluid being very opaque, compared with lungs.

2. The lung in affected side is more opaque uniformly, due to compression by the effusion.

3. The heart shadow is also, of course, displaced away from the fluid.

When the fluid is free in the pleural cavity, changes in

the patient's position will cause a corresponding change in the appearance on the screen; while in an encysted pleurisy the shadow is stationary.

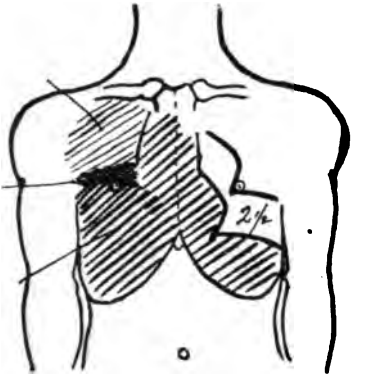

Diagram 5.—Pleurisy.

Right-sided effusion—tapped—80 ounces. Note that upper surface of diaphragm on affected side cannot be distinctly seen, owing to adhesions and thickened pleura, &c. The *upper line* points to "compressed" lung—(shaded area). The *middle line* points to a narrow area, where "X-Ray" shadow was intermediate between that of lung and liver. Percussion over this area gave absolute dulness. The *lower line* points to liver shadow. The movement of diaphragm on affected side was practically nil—probably owing to adhesions.

"X-rays" also show much more displacement of the heart than can be elicited by percussion, in a certain number of cases.

Interlobar effusion can also be readily distinguished.

In emphysema of the lungs the screen shows a much brighter and more transparent condition, due to dilatation of air vesicles, and greater quantity of contained air.

This is, of course, present on both sides.

In pneumo-thorax, both with or without hydro-, pyo-, or hæmo-thorax, the pleural space filled with air is remarkably transparent, when contrasted with opposite side of chest.

Tumours of intra-thoracic origin, malignant growths in

lung, pleura, or mediastinal glands, also bronchial tubercular glands, and some cases of œsophageal cancer, all yield distinctive "X-ray" signs.

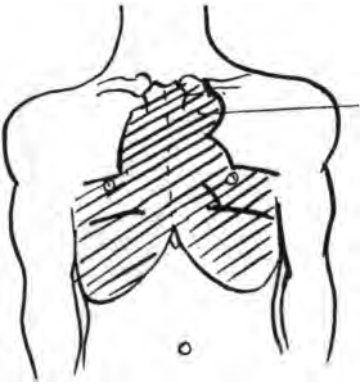

DIAGRAM 6.—ANEURYSM OF AORTIC ARCH.

Contrast this diagram 6 with the normal heart, No. 7. The line through left shoulder indicates the shadow of the aneurysm; which had undergone consolidation under treatment. Note also the shadow of the *broad, flabby,* dilated heart.

Aneurysm of Aorta.—This condition is very readily diagnosticated by X-rays, and especially in early stages seems of larger area than percussion can indicate.

Normal Heart.—Its size, shape, and character of pulsation (*i.e.*, its size and position in systole and diastole) can be watched and measured on the screen.

In many forms of cardiac disease most valuable information is obtained by observing changes in the size, shape, position, and pulsation of the heart. For instance, dilatation of an auricle can be distinguished from that of a ventricle.

It is superfluous to indicate the value of these observations during the treatment of cardiac dsease.

In the abdomen we can now measure accurately the size, position, and shape of a distended stomach by giving

a large dose of subnitrate of bismuth, and observing the shadow cast by the stomach fifteen or twenty minutes after.

I should also mention that dilatation of the œsophagus, due to stricture, can at certain levels be diagnosticated by the same means.

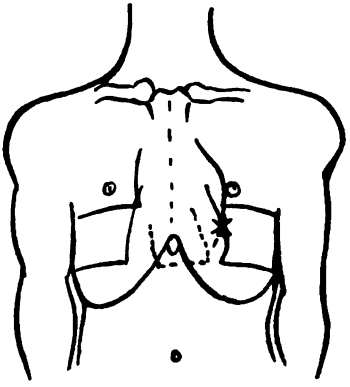

Diagram 7.—Normal Heart.

This shows the contour shadow of the normal heart in *full expiration* and *full inspiration*. In the latter position the area of *cardiac dulness* as obtained by *percussion* is marked in dotted lines; and the impulse beat, both to sight and touch, is indicated by the "star."

In summing up the uses of "X-rays" in medical diagnosis I would most vigorously insist that this graphic method for observing and recording the thoracic or abdominal organs by the eye should be used only as an aid to and in conjunction with the tactile and auditory senses of percussion and auscultation.

[Before and after the meeting Dr. Haughton demonstrated this method of screen examination with his apparatus on a number of patients suffering from phthisis (early and late), malignant tumour of œsophagus,[a] and pleurisy, who were very kindly placed at his disposal for this purpose by Dr. Travers Smith and Dr. Percy Kirkpatrick.]

[a] Since this Paper was read this case (malignant tumour of œsophagus) has died, and I am informed by Dr. Travers Smith that the *post-mortem* examination confirmed the "X-ray" appearances in every way.

DR. KIRKPATRICK considered the paper just read by Dr. Haughton as one of exceedingly great value as a supplemental aid to the ordinary methods of diagnosis. But the X-rays do more than this, for they give information unobtainable by any other method. He was particularly struck with their value in pneumonia. Acute croupous pneumonia is said to get quite well, and the physician looks on the case as cured; but by the aid of the X-rays in one of his cases, Dr. Haughton had demonstrated to him that the lung had not recovered its elasticity, and acting on the information he secured the patient sick leave and rest until the X-rays demonstrated that the lung had returned to the normal. In a case of broncho-pneumonia, Dr. Haughton demonstrated to him that the diaphragmatic excursion was limited to less than normal on both sides. Its value in the incipient stage of phthisis was made clear in a case of his in which the patient had had a vomiting of blood. The loss of blood did not recur, and when examined no physical sign of disease was discernible; by the X-ray screen Dr. Haughton showed an opacity in the apex of the left lung and diminished excursions of the diaphragm of the affected side. Since then the patient has developed the ordinary physical signs of tuberculosis, and bacilli are found in her sputum.

DR. R. LANE JOYNT considered that they were greatly indebted to Dr. Haughton for his excellent paper and his demonstrations of the rise and fall of the diaphragm, the value of which information can hardly be over-estimated in dealing with thoracic diseases. He recommends all physicians to bear well in mind that all skiagraphs exaggerate the size of the part photographed, and this amount of exaggeration is dependent on the distance of the patient from the plate; thus a distance of four inches from the plate gives an enlargement of one-fourth.

DR. HAUGHTON desired to say that Dr. Watson's skiagraphs of the thorax as shown by Dr. Finny were the best he had seen. The thorax was difficult to photograph with the X-rays, and he thought it was due to Dr. Watson that the excellence of his skiagraph should be acknowledged. With Dr. Lane Joynt he recognises that all X-ray photographs exaggerate the size of the object, due to a disturbance of the visual angle. He, however, hopes to correct this error by triangulation.

FOUR CONSECUTIVE CASES OF PERFORATED GASTRIC ULCER SUCCESSFULLY OPERATED ON.

By R. F. TOBIN, F.R.C.S.;
Surgeon to St. Vincent's Hospital, Dublin;
Examiner in Surgery in the Royal College of Surgeons, Ireland.

[Read in the Section of Medicine, April 11, 1902.]

PERFORATED gastric ulcer is such a growing subject, and one of so much interest to both physician and surgeon, that I shall make no apology for venturing to introduce it for discussion, by laying before you some particulars of, and remarks upon, the four cases referred to in the agenda paper. The rate at which the subject is growing I would indicate by quoting the concluding remarks of a remarkable paper read by Dr. Parsons before this Section in 1892. In it he says—"If I have persuaded any of my audience to add acute peritonitis to the generally admitted four great surgical emergencies requiring immediate operative interference, my object in writing this paper is gained." These remarks were very fitting then. Surely there is no one here to-day to whom he could address them. His object has been completely gained.

The four cases I am about to refer to were all in St. Vincent's together at the beginning of this academic year, and I opened the session with a clinical lecture on them. Three of them had been operated on by me, the fourth by my colleague, Dr. Alfred Smith, at whose request I have incorporated it with mine—first, because it has much in common; secondly, because he refuses to have anything to do with it. "I never," says he, "travel beyond my own area, except on compulsion."

The following are points of resemblance in these cases. All were women between the ages of twenty and thirty, and of that weak texture that marks anæmic girls. All had

previously complained of gastric trouble; three of the four were domestic servants. In all the situation of the ulcer was the same; in all the method of operation was, excepting one or two details, identical; in all there was not only recovery but a more rapid return to good condition than would probably have been the case had they been admitted to hospital just before the perforation had occurred and had that catastrophe been averted by rest and medical treatment. The symptoms in the four cases at the time of operation also showed much uniformity—there was pain in the left epigastric region and pain above the left clavicle, scanty vomiting and retching, rigid abdomen, absence of abdominal respiration, absence or diminution of liver dulness, and shock.

Let me refer in detail to some of these points.

1. The position of the ulcer: They were all situated as in the specimens I show you from the Museum, R.C.S.I., at a point an inch or two in front of the œsophageal opening. This, as far as I can judge from my own observations, records of cases, verbal communications and specimens in museums, seems to be far and away the most common site for the operating surgeon to find a perforation. Granted that this is so, the interesting question arises, Why is it? My explanation, not of the ulceration but of the perforation that accompanies ulceration in this locality, is as follows:—The perforation, as I have just said, occurs in the area of the stomach that extends forward from the œsophagus underneath the liver, an area that would be pressed upon by the liver were that organ unduly depressed or the stomach unduly drawn up. Now, owing to the laxity of tissue in the usual sufferers from this disease, and to the fact that they are on their legs all day long, the liver is not well braced up. Moreover, the stomach, owing to its fixity to the diaphragm, is being continually drawn through a long range of movement as the anæmic sufferer goes about her work. Now, thinking

of these conditions and how they are likely to act on the tissues of the area under consideration when they have become congested, infiltrated, and lost their elasticity—considering these things, I wonder not how congestion goes on to ulceration and ulceration to sloughing, but how it is that without rest these patients ever recover. And at the same time I understand, a fact with which we are all acquainted, the healing power of rest in the treatment of such cases.

The next point I would refer to is the early, the very early disappearance of liver dulness in the mesial line. This earliness is, I think, diagnostic of anterior perforation; I never opened or was present at the opening of an abdomen in a case where there was an anterior perforation without noticing an escape of gas. Gas in that locality must lead to diminution of resonance, and it is but right to suppose that most of such gas escaped at the moment of perforation.

The third point I wish to emphasise has reference to shock; how greatly shock is increased by movement.

One of the cases of which I am speaking was sent to me by Dr. Kennedy. He saw the case almost immediately after the occurrence of the perforation. Shock was not then very pronounced, but it became profound, as no doubt he will tell you, during the short transit to hospital. I met the case in the hall of the hospital on arrival and had her taken straight to the operating theatre, and when on exposing the perforation we saw how at every turn, and cough, and attempt to vomit, the stomach contents welled up or welled out, the inadvisability of moving such cases was strongly borne in upon us. Dr. Kennedy did what has been the rule in such cases. The surroundings of the patient banished the idea of operating where he found her, but he tells me that, having seen the case from start to finish, notwithstanding that she recovered, he would not again move such a case until the opening had been closed. In contrast with this case as re-

gards shock was one I saw in consultation with Dr. Price at Greystones. On getting out of the train at that station one evening in August last I found Dr. Price waiting for me on the platform. He told me that the maid-servant of a gentleman in Greystones had sustained a perforation of the stomach that forenoon, and he wished me to see her. We went to her in company with Dr. Keegan, who happened to be on the platform. The perforation was readily found and closed, although I had with me only the simplest appliances, and the patient made a good recovery. In this case the perforation was larger than in the case already referred to, and the contents of the stomach about the same, but owing to her having been kept perfectly quiet the collapse was not profound.

From the considerations laid before you, I would deduce the following rules for guidance :—

In case of perforation of the stomach the patient should be moved as little as possible till after the suturing of the perforation. A perforation in the stomach—I would say in any intestine were it within the limits of my subject—should be treated like a perforation in a blood vessel, *i.e.*, cut down upon and closed *at once*. The surgeon should go to the patient, not the patient to the surgeon. The conveniences of an operating room are not worth the certain loss incurred by transit, for with care and thought asepsis can be secured anywhere. To take a concrete case. If I were called to a kitchen to a servant who had got perforation, I would have her carefully lifted on to the kitchen table, and I would there and then seek the perforation, and, if possible, close it. The operation is, as a rule, an easy one; the necessary appliances very few. A knife, a forceps, a needle and thread, water, towels, handkerchiefs, and rags made aseptic by boiling, a two-inch incision, under cocaine if preferred, will in most cases make matters clear. If it does not, what harm has been done?

I know of only two arguments that are urged against this immediate procedure. First, that the perforation may be so situated as to make its closure a matter of great difficulty. To this I say that such cases are the exception, and it is for the general case one makes the rule. Moreover, I can scarcely imagine a case for which something could not be done. No one has done much work with the stomach without learning that the crudest closing of an opening as long as the peritoneal surfaces are brought together gives good results. As far as my knowledge goes, I would sooner close a perforation with a small clamp or catch forceps and leave it *in situ* to be removed later on, than send a patient on a journey to hospital with gastric contents escaping at every jolt.

Secondly, that it is often well to let the patient recover from shock, and with that end in view she is ill-placed on, say, a kitchen table.

My answer to this objection is that you should not wait for the disappearance of shock. What is the cause of shock in these cases? It is the escape of the gastric contents into the peritoneal cavity. It is in proportion to the amount that has escaped. Now, if you pause, should the patient cough or vomit more will escape. Moreover, these are not instances of mere nervous shock, where nothing harmful is going on while you wait for the patient to come round. On the contrary, processes of the greatest moment are in progress, changes that may end in thrombosis of the mesenteric veins and render recovery impossible. I say, therefore, to the physician, call the surgeon at once to the patient; and to the surgeon, operate as soon as you can get ready even the simplest appliances.

One word in conclusion as to the prevention of gastric perforations. If I have correctly stated the causation this is surely to be found in recumbent rest. In the ward of mine in which the patients of whom I have been speaking were

lying at the beginning of this session there were other beds, and in these beds were elderly domestics with chronic ulcers on their legs. Both the young domestics and the old domestics were, as I pointed out to my class, the subjects of ailments that quadrupeds never suffer from, and that bipeds who take proper rest do but rarely. Surely, therefore, in rest, and in rest in the recumbent position when possible, is to be found the prevention of such ailments. But the domestic servant, who is the first of the household to get up, and often the last to go to bed, is, as a rule, left during her long waiting hours with no means of lying down or even of reclining, however weary she may be. Is this right?

To what waste of force and to how many other ills in addition to those I have named does it not give rise? It is out of the question going further into this subject at the conclusion of a brief paper such as this. Suffice it to say that the climate and the conditions under which we live, the crowding in buildings for the purpose of shelter, in vehicles for the purpose of transit, the coldness of the ground preventing the easy eastern solution of the question, the stress of competition, have made us forget in a great measure as regards our own persons, altogether as regards the persons of those committed to our care, what is the most essential condition in taking rest. How many of us day by day tell the servants who come to us with chronic ulcers of the stomach or of the legs to rest as much as possible in the recumbent position, at the same time knowing well that during the intervals of their work there is in most houses, short of going to bed, no means of their properly carrying out the suggestion that we offer?

Dr. Redmond thought the great difficulty in such cases was the diagnosis of perforation; there may be little or no shock.

In one of his cases he found the patient sitting in bed leaning forward, supported by two friends, and crying out with pain. She had been in excellent health all day and had eaten heartily of mutton at dinner. There was no diminution of the area of liver dulness. He recommended operation; a perforation at the cardiac extremity of the stomach was found and sutured, and the patient made a good recovery.

Mr. H. G. Croly thought they should all be very grateful to Mr. Tobin for bringing these cases forward, and particularly for his sound advice to them to bring the surgeon to the patient. Gastric ulcer cases do not bear carriage. To convey such a case any distance in a cab, jolting alone and having the stomach contents extravasated into the peritoneum was to court death. On the other hand, no cases are so readily dealt with in their own homes. All the surgeon requires is a knife, a forceps, a needle, and a bit of thread. If necessary, he would prefer to operate first and convey the patient to hospital afterwards. His advice in all these cases, even in cases where the diagnosis was not absolute, was to operate without delay; a laparotomy will ensure an accurate diagnosis, and, if an ulcer is not present, the incision in no way increases the patient's risk. Mr. Tobin's paper is full of sound advice and a creditable record of good surgery.

Dr. Kennedy said that he found the patient he sent to Mr. Tobin rolling about in bed as if in hysterics. He was with her an hour after perforation, and did not find the shock as severe as the text-books led him to expect. The abdomen was not distended; the abdominal muscles were rigid; there was no vomiting; one hour later she looked as if dying. Three months before seeing this case he was called to see a similar case. Though forty hours had elapsed from the perforation there was no vomiting; an operation was performed, and the patient died in a few hours. This girl had been treated for gastric ulcer in St. Vincent's Hospital, from which she had been discharged as well. At the time of the perforation she was at business in a draper's shop, and continued working for an hour after the accident. He recommends home operations.

Dr. Winter found no diminution of liver dulness in a case which he had observed; there was a complete absence of shock, and no vomiting. Removing the patient from her home to hospital occupied three-quarters of an hour. He would like to

hear from Mr. Tobin the after-history of his cases, for there was an idea that such cases did not always do well.

Dr. James Little had seen many cases which had all the symptoms of perforation recover without operation. In one case, when called in consultation, he found what might be called a typical case of perforation with the peritonitis of extravasation, yet that patient recovered, and for years past she hunts regularly.

Dr. Finny looked on the diagnosis of the perforation as the real difficulty in these cases. One of his patients who had all the typical symptoms of perforation—vomiting, tympany, pain, and so forth—was operated on three hours after the outset of the attack, and all the viscera were found to be healthy; there was no ulcer whatever. The abdomen was stitched up and the patient made a good recovery. He has seen a good many operations for perforating ulcer of the stomach, and he cannot agree that it is so easy a performance as some think, particularly if the perforation occurs on the posterior wall—such an operation could not be successfully carried out with lamp or candle light. Absence of liver dulness is not an essential symptom in the early stage of the disease.

Dr. O'Carroll was of opinion that the sooner the operation is performed after the perforation the better. Some few cases may recover under medical treatment, but he thinks the safer practice is operation. The onset of shock is the call for laparotomy; never postpone interference on account of shock. The gradual and progressive increase of the pulse rate is a valuable sign of perforation in these cases. All the fluid found in the peritoneum should not be looked on as coming from the stomach; the peritoneum itself on the onset of inflammation pours out an abundant secretion. Liver dulness is of little importance as a symptom, and as a rule vomiting occurs more regularly after lesion of other portions of the alimentary canal than of the stomach. Symptoms of perforation are very varied; in one of his cases the patient got the symptoms of perforation and recovered; but she developed a systolic bruit, which extended from the epigastrium along the aorta. Five or six weeks afterwards she returned to hospital and was operated on. The autopsy revealed the presence of an encysted extravasation from a perforating ulcer on the posterior wall of the stomach, which pressed on the aorta.

Dr. Parsons, whilst warmly congratulating Mr. Tobin on his

promptness and successful operations, felt that the physician who was called to a case of sudden illness and recognised a perforation had a more difficult task than the surgeon who operated, for, after all, the operation is not a very serious one. In cases of doubt he looks on a diagnostic section of the abdomen as a perfectly justifiable operation. He has found the steady increase in the pulse rate a valuable symptom in these cases, and in his experience the area of liver dulness was diminished, if not at first soon afterwards. The escape of gas found on opening the abdomen he considered one of the most marked signs of perforation. He favoured the removal of the patient to hospital, if the hospital is within reasonable distance and the method of conveyance suitable. The advantages of operation in a properly-equipped theatre are enormous. In Dr. Winter's case there was some difficulty in suturing the perforation owing to the sodden condition of the tissues, and eleven days afterwards the patient died of pneumonia. He cannot agree with the suggestion that Trendelenburg's position is a suitable one for the patient suffering from perforation with extravasation; it tends to throw the extravasated material on the lymphatics of the diaphragm and to promote septic posioning by their absorption.

Sir C. J. Nixon, before calling on Mr. Tobin to reply to the criticism of his interesting and suggestive paper, would just like to say a few words on those cases that leave hospital as cured, as he finds that they are the cases which come back for operation. When being discharged from hospital they have none of the signs or symptoms of the disease, they are practically cured as far as can be made out, yet it is this class that furnishes the surgeon with material. The marvel is, in many of these cases, how they survive the digestion of their food, and that perforation is not more common. A patient came under his care who had lived some years in New York; during that time he had been on several occasions an inmate of the Bellevue Hospital, where he was treated for gastric ulcer. He came to the Mater Hospital very ill and emaciated, vomiting and in pain. As food would not rest on his stomach, he was fed by nutritive enemata and suppositories; after a time he got liquid food. He now craved for a mutton chop and said that it agreed with him in the Bellevue Hospital. He got the chop, eat it with a relish, and the diet was continued. He left the hospital, but soon afterwards came back and died.

An ulcer was found near the pylorus, as large as a finger-ring. Why ulcers do not perforate the gastric walls more frequently may be explained by the fact that the majority of them are chronic and form adhesions to surrounding tissues; when perforation does occur its site is usually at the cardiac end of the viscus, where the ulcers are acute and speedily perforate the thin-walled œsophageal extremity. Gastric ulcers tell us how necessary it is to give patients full and important directions as to their dietary. Of the symptoms discussed, he is of opinion that diminished hepatic dulness is more commonly met with in general peritonitis than in perforation of the stomach.

Mr. Tobin, in reply, stated that the object of his paper was to try and induce physicians to bring the surgeon to the patient, not the patient to the surgeon—not to send a case of perforated gastric ulcer to hospital, but to keep it at home and have it operated on there. He looked on the shock as being occasioned by the extravasation, and to be proportioned to the amount of the extravasation. Of course it may be due to something else, but holding the views he does he thinks the conveyance of a patient to hospital, when all the while more and more matter extravasated is forced into the peritoneum, decidedly injurious. Every one of his cases were diagnosticated by the physician in attendance, and he quite agreed that the difficulty in such cases is the diagnosis. He has seen these cases within the past few months and they remain well. The omission of the toilet of the peritoneum was due to the fact that he was addressing the Section of Medicine. In two cases he flushed out the peritoneal cavity with sterilised water, and in one he used a mop of surgical wool on the end of a stick. He looks on the escape of gas on opening the abdomen as a most valuable sign of perforation. An ulcer on the posterior wall of the viscus would, undoubtedly, greatly add to the difficulties, but, happily for us, perforating ulcers are, as a rule, found on the anterior surface. He has operated more than forty hours after perforation had taken place. On admission to hospital there was a diminution of the area of hepatic dulness in every one of the cases, though the symptom was absent in each one when first examined in their own home. He is in favour of keeping and carrying patients in the Trendelenburg position, when circumstances permit of it.

A CASE OF ASCENDING PARALYSIS.

By ALFRED R. PARSONS, M.D. (Dubl.), F.R.C.P.I.;
Physician to the Royal City of Dublin Hospital and to the National Hospital for Consumption.

[Read in the Section of Medicine, May 16, 1902.]

In 1859 Landry published a paper based on ten cases of ascending motor paralysis. He named the condition "Paralysie extenso progressive," or "Paralysie Ascendante Aiguë." Subsequent writers have described the disease under the latter of these terms, or often, for sake of brevity, as "Landry's Paralysis." In one of the ten cases which proved fatal on the ninth day, no lesion was found in the brain or spinal cord. Landry, influenced by the negative results of this autopsy, and by the absence of bed-sores, urinary troubles, and pain in the back in all the cases, suggested that the possible cause of the paralysis was to be sought for in some disease of the nerves. The hypothesis that paralytic phenomena, not produced by cerebral or spinal disease, may arise from some lesion of the nerves was not propounded for the first time by Landry. It was a distinguished member of the Irish School of Medicine, Robert J. Graves, who first suggested that extensive paralysis without any lesion of the brain or spinal cord may arise from disease commencing and originating in the nervous extremities alone. Notwithstanding the numerous advances in neuro-pathology during the past forty years since Landry suggested that the nerve trunks were the seat of the lesion in his cases, it must, I think, be admitted that the riddle of the pathology of Landry's acute ascending paralysis is still unsolved. The comparative rarity of cases of ascending paralysis, and

the obscurity of their nature, will, I trust, be a sufficient excuse for presenting to this Academy the following clinical record:—

J. M., aged thirty-eight years, by occupation a labourer, was admitted to the Royal City of Dublin Hospital on Saturday, 21st September, complaining of weakness in his arms and legs. He states that the first symptom he noticed was a numbness in his feet, extending to just below the ankles, about 12 30 p.m., on Saturday, 14th September. He went home at 5 30 p.m. and put his feet into hot water to try if he could stop this feeling, but obtained no relief. On Monday, 16th September, the numbness had advanced half way up his calves, but his walking power was not interfered with. On the following day the numbness extended to a little above his knees, and he found that he could not walk as well as formerly. By Wednesday the numbness had reached his umbilicus, and as the difficulty in walking was more marked he consulted my colleague, Mr. Moore, at the Extern Department, who kindly directed him to come to my dispensary on the following day. The weakness in his legs was so evident on Thursday that he was unable to go to work. He walked into the consulting room of the Extern Department with manifest difficulty. There was then no appreciable loss of power in his arms, but when asked to sit on the edge of a table, for the purpose of examining his reflexes, and then told to jump down, his legs gave way under him, and he had considerable difficulty in preventing himself from falling. On Thursday night the numbness went up along his sides and down his arms, and on the following Saturday, one week after the commencement of his symptoms, he was admitted to hospital. He was able, though with considerable difficulty, to walk into the hospital, and on the day following he walked from the ward to the lavatory, a distance of twenty-five yards, without assistance. On 23rd and 24th September, with help from a couple of men, he was able to walk the same distance, but on the 25th September he was quite unable to get out of bed.

Previous History.—He served as a soldier for some years, and was discharged owing to an injury to an eyelid, the result of a gunpowder explosion. He states that he never had syphilis. His family history is good; and the only point noted about his

personal habits is that he usually drank from four to six pints of porter a day.

Physical Examination.—On the 25th September, and subsequently, a detailed examination of his nervous system was made.

Cranial Nerves.—Functions intact, and nothing abnormal detected, except slight fibrillary tremor in the tongue.

Upper Extremities.—These can be moved freely in all directions, but the grasp is feeble in each hand, and if the patient be directed to keep his arm flexed, and an attempt be made to extend it, the muscles yield and the limb is too readily straightened. There is no drop wrist—in fact the wrist can be extended against slight resistance. Co-ordination, and sensation to touch and pain, seem perfectly normal; a pin can be picked up off a hard surface without difficulty. Muscle sense is also normal. Among the vasomotor and trophic phenomena it was noted that the hands were cold and clammy, that the skin was normal, but that the muscles were flabby. The muscles reacted perfectly to the faradic current.

Trunk.—(1.) *Thorax*—Movements were good. The diaphragm moved well. No loss of sensation to pain, touch, or temperature. Percussion and auscultation revealed nothing abnormal. (2.) *Abdomen*—Spleen not palpable; area of splenic and of hepatic dulness normal. Full control over bladder and rectum. The patient is, however, unable to sit up in bed except by raising himself on his elbows, and then supporting himself on his hands. Sensation to touch, pain, and temperature was normal over the abdomen. The superficial abdominal reflexes were not obtained, but there was no difficulty in eliciting the cremasteric reflex. There was no pain in the spinal column.

Lower Extremities.—The loss of power is not absolute in the lower extremities. Movements are, however, extremely feeble, and prevented by slight resistance, except adduction of the thighs, which is fairly good. There were no sensory disturbances. The superficial and deep reflexes were abolished. The feet were cold and covered with perspiration, and the muscles were flabby. The loss of power in the leg, arm, and trunk muscles became more and more marked, so that he was unable to separate his legs if they were placed in contact, or to raise himself in bed. His hands, however, did not become absolutely paralysed, and, at his worst, if his dinner were cut up for him, and placed on a chair at his bedside, he could, by rolling on to his side and getting his

face nearly into contact with the plate, introduce the food with a spoon into his mouth.

October 14th—Mr. Arthur Benson examined his eyes, and found the light reflex normal, that the pupils contracted for accommodation, and that the fundus was also normal.

October 15th—Some indications of returning power in the lower extremities were noticed. He could slightly flex the limbs, so that the posterior surface of the knee was six inches from the bed. He could separate his heels to a distance of seven inches by working them out along the bed. He could not raise the heels off the bed, but if separated he can approximate them The plantar, abdominal, and epigastric reflexes were still absent. The calf and thigh muscles were somewhat wasted, and were tender on firm pressure. He was unable to sit up in bed, and there was little power in the upper extremities. Sensation to touch, pain, and temperature was unimpaired.

October 19th—Muscles of upper and lower extremities contracted on faradic stimulation.

October 24th—He was able to be propped up in bed with pillows, for dinner. The day following he was able to raise his right leg more than two feet off the bed, but his left heel only one inch.

October 26th—For the first time in his illness he complained of great pain and tenderness in the calf of the left leg. A few days later this calf seemed a little fuller than that of the right leg.

November 3rd—Pain in calf of each leg, which was so severe that it kept him awake the previous night. Two days later he was free from pain, and on the 17th he was allowed up.

December 8th—He could nearly stand alone, and was able to walk a little without aid.

January 18th—Rapid progress since last note. The patient could walk well, could stand on either leg, and nearly hop. The knee-jerks were still absent, though tone and nutrition of muscles were good. He was discharged from hospital.

April 8th—He walked up to the hospital to know if he might work on roofs. The knee-jerks were still absent.

April 11th—He felt perfectly well, except that he was more tired after his work than formerly.

The treatment adopted in this case was massage and stimulating liniments for the upper and lower extremities,

and strychnine, in increasing doses, was administered internally.

The chief features of this case may be briefly summarised as follow:—A feeling of numbness commencing in the soles, gradually spreading upwards, and in a few days involving the trunk and arms. Three days subsequent to the onset of sensory symptoms there was loss of power in the legs. This motor paresis likewise extended upwards, involved some of the trunk muscles and the upper extremities, but did not affect the muscles of respiration, the muscles connecting the head with the trunk, or any muscles supplied by the cranial nerves. In the paralysed parts careful examination failed to reveal any loss of sensation to pain, touch, or temperature. There was abolition of the superficial and of the deep reflexes. The muscles were rather flabby; they wasted slightly, but maintained their faradic contractility. Vasomotor disturbances were in abeyance, except the coldness and sweating of the hands and feet may be regarded as such.

The most pronounced symptom in the case was an almost purely motor paralysis with abolition of the deep reflexes. In attempting to localise the lesion we may follow Sir William Gowers, who believes that the spinal cord is the part primarily affected, and that the terminal filaments of the upper motor neurons, as they are passing to the ganglionic cells in the anterior cornua, bear the brunt of the disease. In support of this hypothesis may be adduced the presence of histological changes in the grey matter in a few cases. It is furthermore favoured by the persistence of the faradic contractility in the muscles, the absence of any marked degree of wasting, and the comparative slightness of the sensory phenomena. On the other hand, this localisation does not seem to satisfactorily explain the long duration of the absence of the

knee-jerk, which "in the majority of cases does not return until all paralytic symptoms have disappeared." (Gowers.) Influenced by this fact, and by the similarity in the etiology of cases reported as Landry's disease, and the well-recognised causes of multiple peripheral neuritis, some recent writers—Ross, Bury, and Osler—feel, as, indeed, Landry himself did, that the lesion is more probably in the nerves than in the spinal cord. If this latter view be correct we may imagine the disease to be produced by one or possibly several toxic substances which have the property of acting mainly on the lower motor neurons, and slightly, if at all, on the sensory neurons.

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TWO CASES OF ACUTE ASCENDING PARALYSIS.

By JOSEPH O'CARROLL, M.D., F.R.C.P.I.;
Physician to the Richmond, Whitworth, and Hardwicke Hospitals.

[Read in the Section of Medicine, May 16, 1902.]

CASE I.—M. F., an attendant in a lunatic asylum, was admitted to the Whitworth Hospital, under my care, on the 4th Oct., 1901, complaining of pain and tenderness over the region of the stomach, and of swelling of both legs. He was thirty-three years of age, unmarried, and looked fairly healthy, though somewhat spare.

He stated that about three months before admission he began to lose his appetite, so that, whilst eating very little solid food, he yet usually felt as if he had had enough. He began also to lose flesh, and his bowels became confined. Later on he had morning vomiting, which he attributed to medicine, but for which the alcoholic habit was more probably responsible. About a week before admission he noticed some swelling in both legs, and walking caused him some pain. He also had some puffiness of the lower eyelids in the mornings.

He had been some years in the army; had habitually drunk a great deal of alcohol; and a favourite "pick-me-up" was an eggflip composed of two eggs and half a bottle of Worcestershire sauce. A scar on the glans penis seemed sufficient evidence that he had had syphilis.

The family history threw no light on the case.

Physical Examination.—There was œdema of both legs, more marked in the left. Abdomen distended transversely; liver dulness extended, in nipple line, from upper margin of sixth rib to three fingers' breadth below the hypochondriac margin, and, occupying a similarly increased depth in the middle line, it merged in a greatly-increased splenic dulness in the left hypochondrium. There were slight crepitations (œdema ?) at the base of the right lung behind; and there was a systolic apex murmur of the heart. The urine, which, according to the patient's statement, had been of ordinary appearance up to the day before admission, showed now some blood colouring, and in addition, microscopically, some pus corpuscles and casts of nearly all descriptions.

The case was regarded as one of nephritis at first; but it was found difficult to refer it to any particular type, the quantity of the urine being usually about 35 ounces (one litre), the specific gravity low—1012 to 1016. Then the suspicion of renal calculus came up, and later that of renal tuberculosis, but no tubercle bacilli could be found in the urine.

For three weeks after admission the patient was kept in bed, in part on account of the urinary condition, and in part on account of the temperature, which, during the remainder of his life, oscillated from normal in the morning to 101° in the evening. After the first week all œdema disappeared. No satisfactory diagnosis had been arrived at, when on the 30th October he noticed some feebleness in his legs. Next day, the 31st, I examined him carefully, and found that he could make only a very poor attempt to draw up his legs as he lay on his back. The knee-jerks were quite lost. There was no anæsthesia, no tenderness of muscles or nerve-trunks, and Kernig's knee-extension sign was absent. Next day, 1st November, there was flaccidity of the abdominal muscles, and breathing was largely diaphragmatic. On the 2nd November there was great weakness in both hands and arms; but no recognisable anæsthesia in upper or lower limbs or the trunk. No disturbance of bladder or rectum. In the evening he died, evidently by paralysis of the diaphragm. His mind was clear almost to the last moment.

Necropsy.—About half a litre of serous fluid in abdomen; several old pleural adhesions on both sides. *Lungs* somewhat emphysematous and œdematous. *Heart.*—Two large, tassel-like vegetations on tricuspid valves. *Aorta* atheromatous. *Spleen*, 18 cm. long, and proportionately enlarged in other diameters, showed some perisplenitis, and was adherent to diaphragm. *Kidneys.*—Left large, fairly soft, and with slightly adherent capsule; right also much enlarged, but capsule not adherent. *Liver* much enlarged, the vertical diameter of right lobe being 23 cm.; that of left lobe 21 cm. *Pancreas* normal. *Cranium.*—Dura mater somewhat thick, and somewhat increased amount of subarachnoid fluid; slight thickening on inner surface of frontal bone (? syphilitic). *Brain* apparently normal. *Spinal Canal.*—A large number of small, flat, bony plates attached to the lace-like arachnoid, and to its prolongations over the nerves (arachnitis ossificans), but there was no sign of recent pachy- or lepto-

meningitis. Neither on macroscopic nor on microscopic examination was any lesion discovered in the brain or cord; but Nissl's method was not applied. The nerves were not examined.

No clear pathological diagnosis could be made. In the presence of tricuspid valvulitis, subacute nephritis, and gross splenic and hepatic enlargement, some general process must have been at work rather than a primary lesion of any one of those organs. The ossifying arachnitis was an old lesion, and was possibly due to the same cause as the slight thickening observed on the frontal bone.

Case II.—On December 2nd, 1901, I saw, in consultation, Mr. J., aged forty-one, a lithographic artist, living on the north side of Dublin. About a fortnight before, his house had been flooded in the basement by an overflow of the river Tolka, and he had had to wade through sewage to get things out of his kitchen. About forty-eight hours later he felt unwell, had some shivering, and had to take to his bed with a continuous sub-pyrexial illness, not apparently typhoid, although there was apparently slight enlargement of the liver and spleen. There was no sign of paralysis.

Dec. 3rd.—His wife noticed that when he had to get out of bed he was feeble on his legs. In the evening he was quite powerless in the legs, and the bladder began to dribble.

Dec. 4th.—I saw him for the second time this evening. He lies extended on his back, perfectly clear in mind, uncomplaining, and apparently unconscious of any discomfort, and without any anxiety as to his condition. His bladder is distended and dribbling. No knee-jerks; no power in legs; stroking the soles of the feet causes the very faintest flexion movement of the toes. Kernig's knee-extension sign absent. Sensation for touch is absent from the soles to the fourth rib; above this level, for a zone of about two inches, he winces now and then at a mere touch, as if it caused pain. Sensation of pain is dull, but he winces rather suddenly when a pinch or a pull at the hair of his legs or pubis becomes severe. Breathing is mostly diaphragmatic. The abdomen is rounded, tympanitic, and tense, though it moves with the diaphragm. There is incontinence of urine. Power and sensation in the arms are good. He is, and has been, unduly wakeful. Pulse 110, temperature 101·8°. No tenderness of muscles or nerve-trunks.

Dec. 6th.—Third visit. Condition as before, but the anæsthesia has advanced still higher. Breathing is difficult. Mind clear.

Dec. 9th.—Died by paralysis of diaphragm.

I elicited from this patient that he had lately taken up photography as an amusement, but he had not been handling any chemicals other than hydrochinone and sodium hypobromite. I could get no history of anything in his daily work likely to have set up any intoxication. There was nothing in his personal or family history to suggest syphilis, though I could not exclude it.

Unfortunately I could not get a *post-mortem* examination.

These two cases resemble one another in the fact that the onset of paralysis had been preceded by a pyrexial illness of indeterminate character, the paralysis supervening more or less suddenly as a terminal phenomenon. They resemble one another closely in the general course of the paralysis and in the fatal issue; but there is this marked difference between them—that in Case I. the paralysis began in the lower limbs, then involved the trunk muscles and the arms, and finally the diaphragm, and that the functions of bladder and rectum remained undisturbed; while in Case II. a somewhat similar paralysis was accompanied in its earliest stages and throughout by paralysis of these organs. If we were to assume that the primary lesion in both cases was one of the spinal cord we should have to suppose that in Case I. it involved the cord from almost its lowest levels, but avoided at those levels the centres for the pelvic viscera, while in Case II. it started from the lowest levels of the cord, but showed no discrimination in favour of the visceral centres. Such an explanation of the first case would be acceptable enough, were it not for the difficulty in imagining an intoxication or an inflammation so narrowly selective in its action as this would imply. On the other hand, we are acquainted with several forms of intoxication in which the peculiarity obtains that the skeletal nerves are affected while the visceral ones are not; and thus limb paralysis may be extreme while the bladder performs its

functions normally. Such are, for instance, the neuritis of alcoholic, arsenical, and diphtheritic intoxication. I think the easiest explanation of Case I. is peripheral neuritis. It accords with the patient's previous history, and with our general experience. Unfortunately it, too, demands a selective action of the intoxicant on the motor fibres, but it is our ordinary experience that many forms of intoxication bear more upon one set of fibres than on others, and, indeed, the exemption of one set of fibres rather makes for neuritis. Case I., therefore, may go into the category of multiple neuritis, and falls into line with a large number of the cases of so-called Landry's paralysis. It is, of course, to be realised that the ossifying arachnitis was an old condition, and had probably no part in producing the symptoms under discussion.

With regard to Case II., I find it much more difficult to accept the theory of neuritis. The early involvement of the bladder is quite foreign to our experience of peripheral neuritis, and can only, I believe, be explained on the supposition of a morbid process operating within the spinal canal. We have here motor functions, sensory functions, and lower visceral functions in abeyance together. Nothing will explain this conjunction so easily as an intra-spinal process. Some years ago I watched an almost similar, but more prolonged, case in a young woman, and I made the diagnosis of Landry's paralysis. The necropsy revealed a suppurative spinal meningitis, such as we find in epidemic cerebro-spinal meningitis. It was probably secondary to a suppurating salpingitis which was also present. I have no proof that this was the explanation in Case II.; but I cannot help supposing that some mischief, organic or toxic, acting within the spinal canal, underlay the symptoms of that case. Whether this mischief acted directly on the spinal centres in the cord or on the emergent nerves within the spinal canal I see no way of deciding with reason.

These two cases, capable of being grouped together under the heading of acute ascending paralysis, are not equally reducible to the classification of Landry's paralysis—that is, if we take Landry's paralysis, as his own cases seem to suggest, to be acute ascending peripheral neuritis. But among the ninety-three cases reported as Landry's paralysis, collected and analysed with great labour by Dr. Judson S. Bury in his book on peripheral neuritis, there is a considerable number in which changes were found within the spinal canal—in some bacillary infection of the cord (typhoid), in some meningo-myelitis, in some areas of softening, in one the virus of rabies, in some hæmorrhages or serous effusion, and various other changes: from which, I think, we may conclude that the name Landry's paralysis is a useful clinical label, but that it conveys little or nothing as to the pathology of such cases. My two cases, observed, I regret to say, much less perfectly than I should wish, suggest the deduction that acute ascending paralysis may be extra- or intra-spinal in origin, but that, at least when fatal, it ultimately takes in the spinal part of the multiple reflex arcs, the health of which is necessary for the ordinary functions of life.

Dr. Finny said he had a feeling of doubt as to the meaning of Landry's paralysis after hearing the papers. Some of the classifications were confusing. In Landry's disease the urinary organs are unaffected and the sensation is normal. Yet in two of the cases reported they heard that the patients had urinary troubles. The toxin seems capable of affecting the motor neurons and passing over the urinary centres in the cord. The absence of lesions may be accounted for by the insufficient means at the command of the pathologists in the past to detect them; and now when they are so much better prepared to detect lesions it is to be expected that they will be found. He had had two cases of the disease under his care—one, that of a girl, aged 18, who came to hospital after tramping about all night in rain. She

complained of loss of motor power, paralysis supervened, quickly ascended to the respiratory centres, and she died of paralysis of respiration. He thinks there are many cases confounded with Landry's paralysis. He looked on Dr. Parson's case as a typical example of the disease, and he also thought one of Dr. O'Carroll's was to be so considered.

Dr. Dawson said he would like to know from Dr. O'Carroll if his first patient came from the Richmond Lunatic Asylum, for some of the earlier symptoms were not unlike the early symptoms of beri-beri as noticed in that Institution. If the symptoms were due to a toxin, it is difficult to understand how they should follow such a systematic course. He inclined to the view that the disease was the outcome of overwork and malnutrition—conditions that were fulfilled in Dr. Finny's case.

Dr. Travers Smith said that at the present time he had a case of Landry's paralysis under his care; the patient is a boy, aged 11. On May 10th the lad noticed that his knees were feeble, but if the knees were kept stiff he walked. On the 16th the paralysis was marked, and if he attempted to cough, the abdominal muscles failing to act, the effort ended in a simple blowing sound. His voice production and sensation are normal; his reflexes are lost, and the deep muscle sense was not well marked. On examining the erector spinæ muscles it was observed that their reflex was increased. The boy is very hysterical, crying all day. He suffers from incontinence of urine. He (Dr. Smith) looks upon the disease as being due to a toxin, with a strong affinity for the motor neurons, to an action to which the visceral centres are not susceptible.

Dr. Potter said he would like to know if Dr. O'Carroll's patient, who was an old soldier, had ever had malaria, or lived in a malarial country?

Dr. Craig said the name "Landry's paralysis" made a clinical picture. Toxins are prone to attack neurons, and he would add that the further from the central nerve cell elements the axon is the more susceptible it is to the poison.

Sir C. J. Nixon said he quite agreed with Drs. Craig and Travers Smith that the name "Landry's paralysis" is simply a clinical term, as is locomotor ataxy. He, in Landry's paralysis, recognised three distinct lesions—(1) Acute multiple peripheral neuritis; (2) acute anterior corneal myelitis; (3) acute ascending paralysis,

with anterior myelitis. Dr. Parsons had given the credit to Dr. Graves, of Dublin, for first pointing out that when the lesion is not found in the central nervous system it may be found in the peripheral extremities. This he (Sir Christopher Nixon) thought did not fairly explain Dr. Graves's views. Dr. Graves placed on record his case, that of a sailor named McNab, who was suffering from a tight and painful stricture, and it was noticed that as the stricture was dilated so did his lumbar paraplegia disappear, and the ratio of improvement continued *pari passu*, so that when the stricture was fully dilated the lumbar paraplegia had disappeared, and the sailor was dismissed from hospital cured. M. Brown-Séquard, reasoning from the case, concluded that the peripheral irritation of the stricture had produced a reflex action in the nerve centre. Afterwards the same view was adopted by Hammond, the American neurologist, and others. Gull's views were much the same as those expressed by Dr. Craig, that the further the axon is removed from the trophic nerve centres, the more susceptible it is, such cases being in reality polyperipheral neuritis. That toxins do exhibit a preference for motor centres is seen daily in the action of curare, strychnin, quinine, ergot, tobacco, alcohol, and so forth. What the precise pathological lesion is, is unknown, and the cases have not helped to solve the difficulty.

Dr. Parsons said he was under the impression that it was during Graves's sojourn in Paris he made the observation that the lesion not having been found in the cord by the French pathologists, it may be situated in the peripheral extremities. Gower had expressed similar views to those put forward by Sir C. J. Nixon. Dr. Finny's case was recorded by Ross and Bury. There is a difficulty in defining Landry's paralysis. Of his two cases he gives one only in detail. On admission his patient had no loss of control of the bladder. The toxic agent affected the motor centres and very slightly the sensory ones. The pain in the calf of one of his legs, of which the patient complained when he commenced to get better, was due to thrombosis of some of the veins of the part, which were large and swollen.

Dr. W. J. Thompson said that the points of interest in the case he exhibited were—(1) the age of the patient; (2) the fact that he had been exposed to cold; (3) the enlargement and subsequent diminution of the splenic area; (4) the complete control

of the rectum and not of the bladder; (5) the slight exaggeration of the patellar reflex.

Dr. O'Carroll said that his patient had been in India. He did not come from the Richmond Lunatic Asylum. He called his cases Landry's paralysis on account of the convenience of a term which had become widened to include diseases of that type. Is the lesion intra-spinal? We cannot say. The name is a convenient clinical one, nothing more, and we all know that asking questions is much easier than answering them.

NOTES ON THE YEAR'S WORK AT FARNHAM HOUSE.

By W. R. DAWSON, M.D., F.R.C.P.I.;
Medical Superintendent.

[Read in the Section of Medicine, May 16, 1902.]

FOLLOWING the practice which I have adopted for the last two years, I venture to bring forward a few notes on the more interesting points which have arisen in practice at Farnham House during the past twelve months.

Causation.—Speaking broadly, the causes of insanity may be divided into three main groups—viz., inherited diathesis, moral and mental wear and tear, and intoxication. Needless to say, these groups often, indeed generally, overlap, but occasionally the cause of an attack can be assigned to one alone. Examples of all three are to be found amongst the cases admitted during the year just ended. To deal first with the most widespread influence of all, inherited diathesis, without which other causes would frequently be inoperative, it may be recalled that, as mentioned in last year's notes, an inherited tendency to nervous disease had been found in no less than 78 per cent. of the previous 50 cases. The admissions during the year at present under review show a similar proportion of neuropathic cases, slightly over 78 per cent. In nearly 36 per cent. the diathesis must be set down as the most essential, though not the sole, cause of the mental illness; in 50 per cent. the chief cause was mental wear and tear; while intoxication may be credited with the remaining 14 per cent.,[a] though it had a good deal to do with some of the other attacks. Indeed, in by far the larger

[a] One alcoholic voluntary case was not actually insane, though at the time of admission probably not far from it.

number there was more or less reason to think that toxic influences, of one kind or other, had been at work.

Periodic Insanity.—One of the modes in which a neuropathic diathesis most distinctly shows itself is the occurrence of repeated attacks of insanity. In its most pronounced form, this tendency develops into the recurrent manias and melancholias, or into the combined form known as *folie circulaire.* But even if we are not prepared to go as far as those authors (Kraepelin, for example) who would include every case of recurrence under the head of periodic insanity, we must admit that there are border-line cases where the recurrences are so frequent that it is difficult to decide to which class they belong. A case of melancholia admitted during the winter illustrates this point.

Case I.—The patient was an unmarried woman, aged 44, who had always been dull, lethargic, and apparently somewhat weak-minded. Insane heredity is denied, but there is good reason to suppose that a certain amount of nervous instability has been inherited. At the age of 17 she had her first attack of insanity, and since then four others, the present being the sixth. All have been melancholic in character, with delusions and occasional outbursts of semi-hysterical excitement. There has been an interval of about 10 years between the last two attacks. The present one is said to have developed gradually as the result of religious emotion, and the delusions turn on religion.

The number of the recurrences, their similarity, and the early age at which the first attack took place, all incline one to the view that this case approximates to the periodic insanities, and the rather inadequate causation assigned to the present attack points in the same direction.

Case II.—The same remarks apply, to a certain extent, to a case of acute delusional mania admitted last autumn. Here there was a neuropathic heredity, and the patient, an unmarried woman, aged 39, had had two previous attacks, the first at the age of 24. All three were maniacal, and all lasted about the same time, four months.

Some of the other cases admitted or discharged during the year may prove to be of this character, but sufficient time has not yet elapsed to justify an opinion.

With these doubtful cases it may be instructive to compare two genuine cases of periodic insanity, one of recurrent mania, the other of recurrent melancholia, which have been inmates of the Institution for many years.

CASE III.—The first is that of a married but childless woman, who was admitted in 1859 at the age of about 37.[a] There is said to have been insanity in her mother's family. The patient herself appears to have been a pleasant, worthy, religious woman. The first attack of mania is said to have been quite sudden in onset, but how long it lasted has not been recorded. For many years, if not ever since her admission, there appears, so far as can now be ascertained, to have been little change in the character of the case, but the mental state in the intervals between the attacks is very gradually receding further from sanity. During these intervals, however, which usually last from about a fortnight to three weeks, she is dignified, ladylike and pleasant, albeit a trifle imperious, and occupies herself with fancy-work. Gradually she becomes restless and still more imperious, with a tendency to violence if crossed, and begins to command quantities of expensive things to be got for her, and to distribute orders for large sums of money. After some days of this she has all the furniture, except the bedstead, removed from her room, and retires to bed, where she remains during the rest of the attack. While this lasts she is excited, incoherent, hilarious or weeping, frequently noisy, and sometimes violent, and dirty in her habits, and her language is occasionally extremely forcible—in fact she is almost the antithesis of her saner self. The duration of this part of the cycle is from six weeks to two months, at the termination of which she asks for her clothes, gets up, and resumes her saner habits until the next attack.

This case well illustrates the two points which especially characterise the prognosis in periodic insanity—viz., the

[a] She had been treated here for a previous attack from May 6th, 1853, to August 17th, 1854, and is entered as "cured."

improbability of cure, and the slightness of the tendency to dementia. Such cases go on, as this has done, for a lifetime, suffering attack after attack, and yet in the intervals showing but little progress on the downward grade from year to year.

Case IV.—The second case is by no means so regular in its periodicity. It is that of a young, unmarried woman, aged 31, with a frightfully bad heredity, and, in some respects, most unfortunate home circumstances, who from transitory attacks of depression seems to have gradually developed severer mental seizures, in which she is suicidal at times. She was admitted about 7½ years ago, and the essential character of the attacks (of which there are two or more in the year, at irregular periods) has not changed since, though they have become less frequent, and much less violent (for example, she has not now to be tube-fed, which was frequently the case at first). When at her best she is a busy, happy, kindly little thing, though always morbidly conscientious and self-depreciatory; when ill, the concientiousness develops into delusion, and the self-abasement makes her desire to injure herself and to cease to live. She sits crouched in a corner, silent, miserable, totally given up to her sombre broodings. The transitions are occasionally abrupt. Possibly some might see in this case an approach to alternating insanity, so marked is the contrast.

Other forms of "Neuropathic Insanity."—Of the other forms of insanity which are especially prone to develop in those of neuropathic diathesis the admissions furnish four examples—three of paranoia, and one of the cognate but much rarer disease which has been called by Kahlbaum "Hebephrenia." Of the former, two were admitted for an attack of acute insanity supervening on the more chronic malady. The first case had glycosuria as a symptom, and an account of it has already been published in a study of the connection of that phenomenon with insanity. The acute seizure was melancholic in character, and it was interesting to remark that the mental depression centred on the already existing delusions, and that these fell more and more into the back-

ground as recovery progressed, though they never disappeared, and probably never will. The second case was one of senile acute mania, and also had glycosuria, but here the maniacal delusions were quite different from the paranoiac, which came into prominence only as the mania passed away. The third case of paranoia presented no unusual symptoms, being that of a man of 40, with some insane heredity, who a few years before, after an operation, developed delusions of persecution of the ordinary character, and, as usual in such cases, was better for a while after every change of abode. He left on probation after a time, and appears for the time being to be doing well.

The case of *hebephrenia* deserves fuller notice.

CASE V.—The patient was a lad, aged about 19, but looking younger, with bad family history on his mother's side. He had always been solitary, had lived alone in lodgings, and had been far too much his own master, keeping all sorts of irregular hours. He was not dissipated, but had practised self-abuse for about two years, though apparently not to excess. For some months he had been feeling depressed, with vague ideas that he was "degenerating," and that his appearance was changing for the worse. At length one day he walked down to the sea (about a couple of miles) and threw himself in, changed his mind, got out again, dried himself at a house near, and went back to his lodgings. He made no secret of his act, for which he ascribed various reasons to different people, betraying a suspicious turn of mind. On admission he looked pale and out of health, was constipated, and had a systolic murmur audible all over the heart, but was otherwise healthy and well-developed, though boyish for his age. He showed little reticence in speaking of his suicidal attempt or of his self-abuse, but was at first very miserable and very suspicious, thinking that everything was being done to annoy and torture him, that his sisters were not really so related to him, and so forth. It was very difficult to get him to take the necessary medicine. In about ten days, however, he began to cheer up and take an interest in games, especially golf, while his physical health improved markedly under tonics, cold baths, and attention

to the bowels. (He, however, developed the characteristic tendency to bursts of apparently causeless laughter.) Finally, although not absolutely normal mentally, he was sufficiently recovered to be discharged in about six weeks,* by which time his delusions had practically disappeared, and physically he appeared well and strong, and his heart-sounds were normal. His sleep, however, was not quite satisfactory, and he still required to take a cascara mixture.

One's general impression was that the mental symptoms were in many respects like an exaggeration of the frothy emotionalism, introspection, and self-centredness of puberty, which had been thrown late in his case, partly by inherent causes, partly by environment.

The relation of hebephrenia to paranoia is interesting, and is not fully agreed upon. The resemblance of the two conditions is very considerable, but it would rather appear that whereas paranoia consists in a sort of gradual and progressive hypertrophy of certain peculiarities of the individual, hebephrenia is essentially a hypertrophy of the peculiarities found at a particular period of life in almost all individuals, and is, therefore, related to imbecility. The gloomy forecast in both instances is, of course, due to the intensity of the neuropathic diathesis.

Insanity due to Mental Wear and Tear.—Under this head may be grouped not only those cases which can be ascribed to worry, religious emotion, and the like, but also certain of the "epochal insanities," notably the climacteric and senile varieties. The admissions furnished several examples of cases in which one or other of these influences was operative in causing the attack, though rarely the sole cause. Thus in three cases old age was an important factor, two being maniacal and one melancholic, but in addition two of the cases (one of the former and the melancholic) suffered from glycosuria,

* Since March 31st.

and one from aortic stenosis and nephritis. Even in the maniacal cases the delusions were of an unpleasant cast. Two of the cases recovered, showing that even very advanced age does not render a case hopeless. One rather nondescript case showing mental weakness (probably congenital) and delusions, with occasional slight excitement, of a more or less hysterical type, appeared to derive its origin, so far as the more acute symptoms were concerned, from the climacteric only. The patient, however, had always been shy, lethargic, peculiar, and self-centred, and the gradual development of delusions of persecution about the climacteric probably indicates a state not very remote from a late paranoia. The patient, however, improved somewhat under treatment. She showed in a marked way the insane habit of underlining words in her voluminous letters. It may be noted here that another case, already alluded to (Case I.), had all her life manifested, perhaps even more markedly, the same lethargy, indolence and egotism, with a certain childishness. These characteristics form one of the modes ("stigmata") by which a neuropathic diathesis expresses itself, and on such a substratum actual technical insanity may readily be founded.

CASE VI.—A case of chronic melancholia, apparently caused by overstrain in hunting, together with uterine troubles (prolapse), in a married woman, aged 39, with some neurotic heredity, presented one interesting symptom. In the earlier part of the attack, when it was more acute, she had suicidal impulses from time to time, though she does not appear to have yielded to them further than to beat herself about the head with a poker. Up to about a year before admission, however, she stated that these impulses were preceded by a peculiar epigastric sensation, evidently an aura. It may be added that there was a strong element of hysteria in the case.

Acute Confusion.—Morbid mental states in which the leading characteristic is confusion are now generally held to

be due to toxic influences of one kind or other. One such case under treatment during the year so far supported this contention that glycosuria was present for a time, showing at all events a disordered metabolism.

Case VII.—It was that of a girl of 29, with very bad neurotic heredity, and herself nervous and probably erratic, though in some ways clever and "managing." An interesting point in her history was the occurrence, at the age of about 21, of transitory exophthalmos, with thyroid enlargement, rapid pulse, and great thirst. This followed typhoid fever, and she recovered completely. During it she is said to have been mentally elated. The present attack is attributed to overwork and worry, and began with gradually-developing peculiarities and vague delusions that everything was going wrong, and the like, which lasted about six months. Some 2½ months before admission she had an unpleasantness with a friend, from which time she appears to have become worse, restless, and confused and obstinate, but able to pull herself together. Other measures having failed, she was sent here, and on admission was excited and very restless, childish and confused. She had great difficulty in expressing herself, and would often begin a sentence several times before she could finish it. Impaired attention and loss of memory for recent events were marked. The knee-reflexes were increased. The urine contained traces of albumen and of sugar. Sleep was bad, but digestion seemed fair. Both albumen and (later) sugar soon disappeared, and, curiously, after the latter had ceased the quantity of urine increased greatly. Nine days after admission suprarenal administration was begun, and was kept up in increasing doses for nearly a fortnight. There was possibly some improvement under it, but it was very slight. Later small doses of thyroid were given for about a fortnight, but produced no marked effect on the mental state. However, she continued to progress under general treatment, and recovered in less than five months from admission. The blood-pressure, high at first (145 mm.), fell to 120 mm. after a month, but subsequently rose again. Shortly before her discharge it appeared to be again on the decline.

Although this case is, therefore, not quite a typical example of toxæmic confusion, the presence of albumen and sugar in

the urine points to the existence of a toxic blood-state, which, however, was probably secondary to the mental worry and other causes.

Other Toxic Psychoses.—Two alcoholic cases, one a sane voluntary patient with commencing peripheral neuritis, the other a case of mania produced by worry in an elderly alcoholic (the alcoholism being the essential, though not the exciting, cause), were admitted during the year, and followed the usual course of such cases by recovering rapidly under treatment, both being discharged within a month.

Several cases associated with *glycosuria*[a] were made the subject of a special study which was published last winter. They have all now recovered, with the exception of a hopeless paranoiac, who indeed exhibited the symptom on only one or two occasions. In one of the best marked of these cases, that of a patient who recovered under anti-diabetic treatment, both the glycosuria and the melancholia which accompanied it appear to have been started by an attack of influenza.

Physical Accompaniments of Mental Disorder.—The interdependence of mind and body is once more brought out by the fact that not a single case admitted during the year was in what could be called perfect physical health. Glycosuria, albuminuria, cardiac disease or weakness, dyspepsia, rheumatism, eczema, or other ailment, was present in one or other, and when the patient recovered usually became ameliorated or got well.

The *mean arterial pressure* was again studied this year in 7 cases, in addition to further observations on four of the cases mentioned in last year's notes. They were as follows:—Melancholia, 4 cases; Mania, 4 cases; Acute Confusion, 1 case; Paranoia, 2 cases. The melancholic cases all showed high pressure, which in one who recovered during the year

[a] "Glycosuria and Insanity." These "Transactions," and Med. Press and Circular, Jan. 1, 1902.

fell below normal before discharge. In 3 of the maniacal cases there was more or less stupor, and the blood-pressure was accordingly high, but fell below normal on recovery. The fourth case had also a high blood-pressure, which was probably habitual to the patient, who was a sufferer from chronic rheumatism. It did not fall on convalescence. The state of the arterial pressure in the case of acute confusion was high, as already mentioned. In those of paranoia it was high.

Physical Health.—The general health of the Institution has been good, and there were no epidemics. The only point of special interest not elsewhere touched on is connected with the diagnosis of the last illness of a patient who died in November.

Case VIII.—The patient was a male imbecile, aged 36, but in development resembling a boy of 15, and mentally quite childish. His head, though not small enough to be called microcephalic, was of the characteristic form. He was fat, ungainly in shape and movements, unsteady and weak, in fact almost paretic. The thyroid was enlarged, heart weak and probably fatty, feet and ankles constantly œdematous. On Nov. 14th he had an attack of indigestion, was given an aperient, and seemed much as usual next day. On the evening of the 17th it was noticed that he was not looking well, and next day his temperature was found to be 102°. Nothing very definite was to be made out except some tonsillitis, and slight tenderness in the left iliac fossa, but there was diminution of urine, and what was passed was found to contain albumen. Diuretics and purgatives were given. Next day he was worse, and on the 20th, although the temperature fell and the throat was better, a tinge of jaundice was noted, which was more marked next day, when the motions, which were rather free, appeared whitish in colour. He was seen that evening by Dr. Walter Smith, who considered the condition probably septic, and ordered an enema with eucalyptus oil, dry-cupping and fomentations over the kidneys, strychnin, and gin. The treatment was a good deal complicated by threatening of cardiac failure, and it also became difficult to get him to take

food. Sleep also failed, and on the evening of the 22nd morphia gr. ¼ was administered by Dr. Smith's advice, notwithstanding which he had a restless night. On the 23rd all the symptoms were worse and uræmia was evidently supervening, as he was semi-unconscious all day, and had a few slight convulsions in the afternoon; and later, after a short period of unconsciousness, he died. Temperature was subnormal on the last two days.

The symptoms certainly point to septicæmia, and the point of entrance of the poison may have been either the intestinal tract or the tonsils. Unfortunately there was no autopsy.

Treatment.—Seven patients were subjected to *thyroid treatment* during the year. Three of these received only small doses, of whom one took 190 grains in all of the dried gland in 13 days, and showed some improvement; though it is doubtful how far this was due to the treatment, which in this form (small doses) has not usually been found of much value. A case of melancholia with high arterial pressure also failed to derive any benefit, but in the case of recurrent melancholia (Case IV.) the results were much more satisfactory. Several times when an attack had begun 5 gr. doses, thrice daily, were ordered, and certainly seemed to act powerfully in mitigating the symptoms and shortening the attack; and the patient on at least one occasion rapidly put on flesh under the treatment.

In four cases the drug was given in large doses for a short time, the patient being kept in bed and treated as if suffering from a mild febrile attack. The cases included two of subacute mania, one of melancholia, and one of paranoia, the two acute cases being somewhat stuporose, with high blood-pressures. The first, that of a patient over a year ill, who had just been treated with suprarenal and showed slight improvement, suddenly became markedly better on being put to bed for the thyroid treatment. Nevertheless it was judged advisable to persist, and she got 375 gr. in 6 days.

The temperature, which had been slightly subnormal, rose a little on 2 days, and thereafter continued normal. The output of urea was somewhat increased, but little loss of weight took place. The patient made a good recovery, got fat, and has remained well. In the second case recovery seemed to be directly due to the treatment, during which the patient, a case of nearly 6 months' standing, improved so markedly as to be practically recovered before it ended. She received 530 gr. in 9 days, but never showed a rise of temperature above normal, though the urea and phosphates were increased, and there was a loss of 6 lb. in weight. Thus it appears that the temperature is not a true index of the physical reaction, as used to be asserted. This case also fattened after the treatment, gaining enormously in weight, and has remained physically and mentally well ever since. She seems therefore to be an almost typical example of a successful thyroid cure. The third case was one of climacteric melancholia with delusions, and it was thought that the usually slow progress of such a case might be hastened by thyroid. She received 345 gr. in 7 days, and reacted markedly to the drug, but nevertheless showed no mental change from it. Yet at the end of the year, 9 months later, she was almost well, and was about to be discharged, so that failure of thyroid treatment does not imply that the case is hopeless, which used also to be stated. The last case was one of paranoia with a weak heart, and the treatment had to be stopped after 160 gr. had been given in 4 days, owing to the occurrence of menstruation, and of a fainting fit. Nevertheless there had been distinct physical reaction, and some slight mental improvement followed. Slight glycosuria in the first case, slight albuminuria in the second (both of which had been observed earlier in these cases), an attack of vomiting, also in the second, and the symptoms in the last case above detailed, were the only *contretemps* deserving mention. The

treatment therefore is certainly one that ought to be tried in suitable cases where recovery seems to be hanging fire. Probably melancholia and stupor are the conditions most likely to benefit, and it may be noted that these are states with high arterial pressure, and that the action of thyroid is to lower this.

An extended study of the effect of *suprarenal administration* in seven cases was published last year.[a] The chief conclusions arrived at were that it would be found most useful in conditions of excitement and exaltation, with low arterial pressure, and, therefore, most so in acute mania of fairly recent origin, uncomplicated by stupor; that it is unlikely to be of value in stupor and melancholia; and that although low blood-pressure is an indication for its use, high pressure does not absolutely contra-indicate it. Since this paper was read it has been tried in two more cases; one of acute confusion, as already mentioned, in which the pressure was high, and in which the effect, though not unfavourable, was not sufficient to warrant persistence; and one of acute mania in a rheumatic subject with high arterial pressure (140–150 mm.). This case received 30 gr. of the dried gland per diem for 3 days, 45 gr. for 7 days, and 60 gr. for over 3 weeks; but here also, although progress seemed to be more rapid during administration, the results did not encourage one to continue. It will be seen that these cases bear out the view that high blood-pressure is to some extent a contra-indication.

Erythrol tetranitrate was tried in several cases in which there was high blood-pressure without good result; but in one case of senile mania, with delusions and stupor, it certainly seemed to act favourably, the mental condition clearing markedly. Nitro-glycerine, gr. $\frac{1}{100}$, thrice daily, was given to a patient suffering from minor epilepsy, in whom bromipin had

[a] "On Suprarenal Extract in the Treatment of Mental Diseases." Journal of Mental Science, Oct., 1901.

for a time lost its controlling influence on the fits, and who also showed bloodlessness of the extremities. It had a favourable effect, the number of the seizures diminishing, though not very noticeably until the dose had been increased to $\frac{1}{30}$ gr. thrice daily. After about 11 weeks the drug had to be stopped, as it began to produce unpleasant effects, but the number of the fits did not again increase. Bromipin continues to act satisfactorily on the whole with this patient, but in February it was thought to be depressing him, and regular small doses of paraldehyde were tried instead. After about 10 days, however, he developed an attack of ephemeral mania, similar to one three years ago, even to some of the details. Bromide of potassium and ergot were given at once, and may have aided in aborting the attack, which was very short. This mixture was also given, apparently with good effect, in another case of acute mania; but such cases tend at times to get well so rapidly that it is difficult to be sure that improvement is due to the treatment.

Paraldehyde in small doses was also tried in melancholia, with doubtful benefit; but in larger doses, combined with potassium bromide, it has been found very useful as a soporific in cases of this class, and seems to improve the appetite. Glycerine and water, with a strong flavouring of essence of cinnamon, form a convenient vehicle for this drug.

TWO CASES OF DISSEMINATED SCLEROSIS.

By JAMES CRAIG, M.D., F.R.C.P.;
Physician to the Meath Hospital.

[Exhibited in the Section of Medicine, May 16, 1902.]

On November 17th, 1899, I exhibited at this Section of the Academy a man suffering from disseminated sclerosis, whose symptoms tallied in a most exact manner with the classical picture of the disease as described by Charcot. There were nystagmus, intention tremors, scanning speech, and spastic paraplegia. I then also reported a case which showed that the disease might occur in early life, and finally I described the course of the disease in a female patient as illustrating one of the most important types of the so-called aberrant cases. Her symptoms started with blurring of vision of an evanescent nature, followed by attacks of transient paresis of the limbs; six years passed before nystagmus was observed, fourteen years before the spastic condition of the limbs became developed, sixteen years before intention tremors appeared and syllabic speech could not be said to have occurred at all. In the time at my disposal I endeavoured to differentiate between hysterical manifestations and this atypical form of disseminated sclerosis.

On the present occasion I venture to exhibit two cases of the malady in order to further demonstrate the variety of types under which the disease may be met.

The first patient is a blacksmith, aged twenty-two years, with good family history, and never had syphilis, who two years ago had a weakness in his legs which passed away in a couple of months. A year ago the weakness returned and has been increasing since. He had a feeling of "pins and needles" in his arms and legs. Some

delay preceded the act of micturition during the earlier months of illness. On asking him to walk it is seen that his gait is staggering, titubating, or cerebello-ataxic. He can stand with his heels together and his eyes closed, showing that he has not true ataxy. He has "slight vertical nystagmus, well-marked nystagmic twitchings at extreme lateral and upward positions of the eyeballs, but none at inferior position. *Vision.*—Field of vision and fundus of eye are normal." His inferior extremities are in the condition of spastic paraplegia—*i.e.*, he has increased knee-jerks, ankle clonus, and toe extension on stimulating the plantar reflex. His speech is of an explosive character rather than scanning; he has not as yet developed intention tremor. The cerebellar gait, suggestive of tumour of the cerebellum, is not accompanied by headache, vomiting, or optic neuritis.

The second patient is a fisherman, aged thirty years, with good family history. He never had syphilis. He dates his first troubles nine months back, when his right leg became weak, then his right arm, and these were accompanied by a feeling of "pins and needles." He does not complain of his left extremities at all. When he walks he represents the spasto-paretic gait in his right leg; he gives his right shoulder a heave up in order to clear the foot in advancing it, but the anterior part sweeps the ground, just as one sees in cases of ordinary hemiplegia. Mr. Swanzy kindly examined his eyes, as well as those of the first patient. He reports: "R. eye, slight internal strabismus (concomitant), which patient states he has always had. Nystagmus, slight lateral in R. E., and very occasional twitch in L. E. Nystagmic twitchings at extreme lateral positions of the eyeballs. Vision, R. E. $\frac{3}{36}$, L. E. $\frac{6}{24}$.

"*Field of vision.*—R. E., probably a central colour scotoma; L. E., no scotoma.

"*Ophthalmoscope.*—R. E., outer third of optic disc very pale; L. E., entire optic disc of a pale buff colour."

The intention tremor is well marked in his right extremities, scarcely at all in the left. His speech is not markedly syllabic. His lower limbs show exaggerated knee-jerks, extension toe phenomenon and ankle clonus on the right side. His right wrist-jerk is increased. Sensory disturbances are absent. His bladder and rectum are not affected. The disease in this case represents a distinctly hemiplegic form, and bears a striking contrast to the other case, which is cerebellar in type.

The ocular phenomena in disseminated sclerosis are of the utmost importance. A transient amblyopia with or without change in the optic discs may be the very earliest manifestation of the disease. Pallor of the disc in one or both sides, or affecting only the outer part of the discs, is of much diagnostic importance, and this pallor may exist for a time without any defect of vision. The sixth nerve is the most frequently affected when one of the ocula-motor nerves is engaged. Peripheral limitation of the field of vision is generally a late manifestation, and is accompanied by appearances of optic atrophy.

SECTION OF SURGERY.

OPERATIVE TREATMENT OF FRACTURES OF LONG BONES.

By THOMAS MYLES, F.R.C.S.;
President of the Royal College of Surgeons in Ireland.

[Inaugural Address delivered at the Opening Meeting of the Section of Surgery, November 8, 1901.]

GENTLEMEN,—To-night I purpose bringing under your consideration a few points in connection with such a comparatively commonplace subject as injury to the long bones.

In recent years visceral surgery has perhaps too exclusively occupied the attention of operators, and with the brilliant result of such concentration of effort you are all familiar, but I think that in the interval perhaps an insufficient amount of attention has been devoted to the consideration of the subject that I now intend to place before you. While in the surgery of the thorax, abdomen, and head the enormous advantages of an aseptic technique have been fully availed of, we have, I feel, been rather remiss in applying the same principles to the treatment of fractured bones. It seems almost as if the boldness and enterprise which have achieved such remarkable results in abdominal surgery are considered entirely out of place when applied to the treatment of fractures. It still is considered compatible with good surgery that a fracture of the shaft of the femur should be followed by a shortening of from one to two inches, and the man who, without a moment's hesitation, would open the abdomen to seek for a possible perforation of the stomach or intestine,

shrinks from the much smaller operation of exposing the broken ends of the shattered femur, and securing perfect coaptation of the broken surfaces by the application of simple mechanical appliances. This, I think, is hardly creditable to us, and shows that, notwithstanding all our talk about the enterprise and boldness of modern surgery, our minds are very apt to run in a groove, and with difficulty do we extricate ourselves from the fetters of tradition. On no other hypothesis can our adherence to present methods be explained. At a time when aseptic surgery was in its infancy there may have been some justification for the unwillingness of surgeons to undertake what seemed great risks, but now, when the principles of aseptic technique are thoroughly understood, and every modern hospital is equipped with the means of carrying out this technique thoroughly, we are no longer justified in trusting to what may without disparagement be spoken of as methods of haphazard, instead of boldly using those of scientific accuracy. I am not advocating that every case of simple fracture should be subjected to operation. Ordinary fractures, for instance of the tibia or fibula, unaccompanied by displacement, usually give excellent results when treated intelligently by the methods hitherto in vogue, but it does seem rather a reflection upon us that we should still regard with equanimity a shortening of the limb amounting to one and a half inches as the result of a fracture of the shaft of the femur, or be content with the permanent lameness and loss of function which so often accompany a Pott's fracture. Every surgeon is aware of the difficulties of treating a fracture involving both bones of the forearm or separation of the lower epiphysis of the humerus. In both these instances deformity and impairment of function are the too frequent results of our present methods, and I would plead, therefore, for a careful consideration of these methods and an inquiry as to the possibility of improving them.

The surgical world owes a great debt of gratitude in this connection to the labours of Mr. Arbuthnot Lane, who has for many years past laboured with but indifferent success to impress his own bold and sagacious views upon the general body of the profession. In America, where traditions are of less influence than they are with us, his suggestions have met with a ready acceptance, but it must be confessed that in Ireland, as yet, little effort has been made to tread the path he has pointed out to us. It is true that in occasional cases, such as ununited fractures, or those resulting in angular union, we adopt modern methods, but I think these isolated instances do not relieve us of the reproach that in this particular branch of surgery Dublin lags behind, instead of being in the van, as it ought to be.

My purpose to-night is not to dilate upon this subject at large, but rather to confine my attention to one or two cases illustrative of the subject under review, and from them to make any larger generalisations that may seem indicated.

Quite recently two cases of rather rare injury were under my care at the Richmond Hospital, and were both submitted first to examination by the X-rays, and subsequently to operation. They were both cases of fracture of the neck of the humerus, with dislocation of the head towards the axilla. As this particular injury is not discussed at any length in the ordinary text-books, and as both the skiagraph and operation taught me a good deal I did not know before, I feel that no apology on my part is necessary for bringing the subject under your notice to-night. As you will see later on, the fundamental question that I have raised in the first part of this paper was forced upon my attention in these two cases.

My first case was that of a woman, aged forty years, a patient in the North Dublin Union Infirmary, sent to me by Dr. Caleb Powell, a Fellow of this College. The accident had occurred some months before, and a diagnosis of dislocation,

with some other indefinite injury to the upper end of the shaft, was made. The shoulder-joint was ankylosed, and the arm practically useless. An X-ray examination by Dr. R. Lane Joynt showed that, in addition to the dislocation, there was a fracture of the anatomical neck without impaction. As there was both pain along the nerve trunks, and œdema of the hand and arm, and as the limb was practically useless, I determined to operate. This I did by an anterior incision, such as is usual in excision of the head of the humerus. The operation in this case, as in all other cases of old-standing uncomplicated dislocations, was very difficult, much more so than is usually found to be the case in resections for disease of the bone. This difficulty was due to the altered relations of the parts, to the thickening of the capsule and ligamentous structures around the joint, and to the general shrinkage which takes place when a dislocation has existed for any length of time. To permit sufficient freedom of movement the long head of the biceps had to be divided and the capsule split very freely. When at length a good view of the parts was obtained, I found that the head of the humerus along its posterior narrow edge was attached by osseous union to the anterior edge of the glenoid fossa, and a narrow area of the venter of the scapula adjacent thereto. On the anterior edge of the glenoid fossa, encroaching on the cartilage, was a distinct crescentic depression, into which the head was imbedded—apparently the pressure of the latter had first set up a rarefying osteitis, followed later on by osseous union between the apposed parts. The bond of union had to be divided with a bone forceps before the head could be removed. Portion of the great tuberosity was removed also, and the case became one simply of resection.

My second case was that of a man aged forty-two years, who fell about fourteen feet on to his head and shoulder. He was at once brought to the neighbouring hospital, where

a diagnosis of dislocation was made and vigorous repeated efforts were made under chloroform to reduce it. It is impossible for me to say if the fracture and dislocation co-existed from the outset, or if, as he alleges, the fracture was produced by the vigorous efforts at reduction. I am inclined to think from the nature of the accident, a fall from such a height, that the two injuries were produced at the same moment, and that the repeated efforts made to effect reduction under anæsthesia were made after due recognition of the nature of the lesion. This is rendered more probable by the fact that when he came under my care some months later even then crepitus was easily obtained, and must have been still more easily obtained a few hours after the accident.

On examination of the injured area a large bony mass could be felt in the shoulder extending inwards beneath the coracoid process; this was smooth, and felt like the head of the humerus. There was but little flattening of the deltoid or prominence of the acromion. The circumference of the shoulde. was nearly one inch greater than on the opposite side. He had practically no power whatever in the arm, and any movement caused pain. An X-ray photo taken by Dr. R. Lane Joynt showed that the head of the humerus was dislocated inwards, and that the main line of fracture was through the great tuberosity. In addition, a long splinter was detached from the outside of the shaft, extending for some three inches downwards.

This case I also submitted to operation, but I found it necessary, in addition to the long anterior incision, to divide part of the deltoid close to its insertion, so as to obtain sufficient room for the subsequent manipulations. I confess I was somewhat astonished on exposing the parts to find the head firmly ankylosed to the scapula, as in the former case. The seat of attachment, however, was lower down on the scapula, and much further inwards. It was not a mere line of bony

union, as in the first case, but the posterior edge, and nearly half of the articular surface, was, as it were, imbedded in the scapula and incorporated with it. All attempts to displace it were futile, and I had to remove it piecemeal with cutting forceps. On the other hand, the long splinter of bone was quite ununited, and showed no attempt at bony union. This is certainly not what one would have expected from *a priori* reasoning.

One of the dangers of this injury is said to be necrosis of the head, but in my two cases at least experience does not support the theories based on *a priori* reasoning. It is undoubtedly a strange fact that the detached head, instead of necrosing, should have become firmly united to the scapula, while the long splinter of the shaft was still unattached. In this case, also, I had to resect a part of the great tuberosity so as to obtain a smooth end to the humerus.

These two cases are, to my mind, typical illustrations of my thesis, that the principles of modern surgery are not applied to the treatment of fractures with anything like the same boldness that they are applied to other surgical ailments.

First comes the ever-present difficulty of diagnosis. I think I am justified in making the assertion that ordinary methods of examination are not sufficient to enable even the most experienced surgeon to make an accurate diagnosis of these complicated injuries about the shoulder. Every Irish surgeon is bound to speak respectfully of the work done by the late Professor Robert Smith, but no one, I think, now-a-days will be found to assert that the admirable rules he has laid down for the differential diagnosis of injuries about the shoulder cover the entire ground, or are in themselves sufficient to enable an ordinary surgeon to make an absolutely certain diagnosis.

To meet the difficulty of teaching students, the teacher is

compelled to adopt a system of classification which divides these injuries into separate groups, and to endeavour to place any one injury in some one of these groups. Hence, as a logical consequence, has arisen the unnatural divisions of these fractures into intra- and extra-capsular, &c., with or without impaction. The learner, with his much smaller experience, is still more urgently impelled in the same direction, and when called to examine one of these cases his first mental effort is to place it in group A or B. Now this dogmatic teaching is, I believe, responsible for very many errors in diagnosis, and I am convinced that if men could approach the questions before them with a more open mind, unhampered by the venerable dogmas of the past, such errors would be less frequent. Nature does not care much for our classifications, and is not withheld by respect for surgical traditions from superimposing a dislocation upon any or every fracture.

The first requirement in surgery is accurate diagnosis, and I do not believe that the precise rules laid down by the great teachers in the past are sufficient in themselves to supply what we require. Every one of us has had experience of the great difficulties that attend the diagnosis of such injuries, and I hope I will not be thought to labour the point when I say that such injuries should not be treated at all until either an X-ray photograph has been made by a competent person, or a thorough examination has been made under an anæsthetic. The former course is far the more reliable and informing, but it is not always available. Even when an X-ray photograph has been taken it requires skill and experience in such work to read aright the lesson it conveys. We must not fail to remember that such injuries may be very complicated, several fractures co-existing, each of which, adding its own peculiar symptoms to the case, may more or less effectually mask its companions. Thus, for instance,

the head of the bone may be obviously dislocated, and yet the characteristic rigidity of the dislocation be absent owing to fracture of the neck, or all attempts at accuracy of diagnosis may be frustrated by the enormous effusion of blood that so frequently accompanies any injury in this region.

The difficulty of accurate diagnosis in such cases is well illustrated by the following case:—A patient of mine in Jervis-street Hospital, with the historic name of John Morley, was sent me from Ballaghadereen, in the County Mayo. He had apparently an old-standing dislocation of the head of the humerus beneath the coracoid process, but on examining the shoulder carefully one could find under the acromion a mass of bony consistence and about the size of a pigeon's egg, or a little larger. He said, moreover, that the dislocation had been frequently reduced, but always recurred. Now I know I am quite sure of your sympathy when I tell you that I made a very bad error in this case, and one not due to ignorance alone, but rather to the influence of the dogmatic teaching I received in my youth. I was convinced that I had to deal with the very rare condition described by the late R. W. Smith, in which, superimposed on a dislocation, is a fracture of the great tuberosity. It is some consolation to me now, in moments of reflection, to know that on that occasion, at least, I erred in the very best company, for my friend Professor Bennett, whose authority in all injuries to bones no one here will question, kindly examined the case for me, and came to the same conclusion as I did.

I operated on the man and discovered that there was no fracture whatever; what I mistook for the detached tuberosity was a calcareous mass in the subdeltoid bursa. Now this is a very interesting case to me, and it is rendered still more so by the thought that even had the X-ray method been available then it could not have helped us much, as the mass of lime salts would have thrown as deep a shadow as

bone. This is a condition that I have never seen described, and, of course, is not included in any of the numerous classifications of injury in this region.

Having, perhaps, at too much length discussed the question of diagnosis, let me take up that of treatment. Having satisfied ourselves that we are dealing with a case of fracture of the neck of the humerus complicated with a dislocation, how should we treat it? My answer to this question is—By immediate operation in the majority of cases. I am convinced that no other method gives promise of an equally good result.

What are the other methods, the traditional ones, if I may call them so? First, to do nothing whatever to the fracture but begin to set up passive motion as soon as possible, so as to establish a false joint between the head, which is pretty certain to become fixed to the scapula, and the upper end of the shaft. I need not waste your time by discussing this method, which is in itself a confession of impotence and does nothing to relieve the pain and œdema due to pressure of the displaced head on nerves and veins. Secondly, to endeavour to effect reduction of the displaced head, and then to treat the fracture.

Everyone who has given any thought to the pathology of this condition will find it hard indeed to believe that such reduction is ever possible. The head cannot be grasped, it can only be pushed with the finger tips; it cannot be rotated. Traction cannot be made on the shaft, lest the few untorn fibres of periosteum be severed and the vitality of the head endangered. Even should the head be forced back into place, one cannot be sure that it is properly applied to the broken end of the shaft. It may be turned topsy-turvy, or it may be implanted in the shaft far below its normal position. However theoretically attractive such a method may be, it is, I think, of little practical value. Thirdly, comes resection

of the head. As this involves a cutting operation, it is not less serious than the plan I have recommended of reduction after incision and exposure of the parts. In recent cases it would only be justified after the former had been tried and failure resulted. In old-standing cases it is practically the only method open to us. The pain and œdema of the arm and hand cannot be relieved until the bony mass of the head is taken off the vein and brachial plexus. The result of resection all the same is, I believe, functionally better than that given by a false joint with the head ankylosed to the scapula.

On summing up these arguments and weighing them carefully, I think one is forced to the conclusion that when a dislocation of the head of the humerus complicated by fracture of the neck occurs in a young, healthy man, especially one who has to live by manual labour, the surgeon ought to make up his mind to operate on it at the earliest possible date. This being granted, let us consider what method of operating is likely to prove the most useful for our purpose. My own experience is too limited to make dogmatic assertions on the subject, but I am pretty well convinced by such experience as I have had on the subject that the anterior incision alone is not sufficient for us. It does not give a sufficiently free exposure of the parts to enable the necessary manipulations to be carried out freely and quickly. My belief is that the cap formed by the deltoid muscle must be raised before one can get proper access to the parts. This can be done either, as suggested by Professor Kocher, by detaching the spine of the scapula along its entire length from the rest of the bone, disarticulating the acromial end from the clavicle and throwing the entire mass down, or by detaching the deltoid insertion from the shaft of the humerus and raising the muscle. This latter seems to me the preferable method, as it does not involve such a serious addition to an already grave injury as Professor Kocher's method, nor does it neces-

sitate the subsequent wiring into position of the detached scapular spine. My plan would be as follows:—An incision starting from the clavicle above the coracoid process would follow the line of separation between the deltoid and great pectoral, as far as the insertion of the former. The periosteum here would have to be raised corresponding to the line of attachment of the muscle, or even a small flap of the bone taken with it. The incision would then follow the hinder edge of the deltoid as high as the point at which the circumflex nerve enters it. The muscle could then be turned up very fully, and the seat of injury thoroughly exposed. By means either of a screw inserted in it, or M'Gill's hook, the dislocated segment could, I believe, be brought into its normal position, and then wired on to the shaft. Such an operation can only be a success if performed very soon after the injury occurs. If any time be allowed to elapse, the shrinkage which takes place prevents either reduction of the dislocation or perfect coaptation of the segments.

What are the objections to this comparatively simple and easily understood operation? That it makes a grave injury still graver, and puts in danger a life that was not previously imperilled. Surely, to say that such an operation imperils a patient's life is really a confession of inability to carry out an operation in accordance with modern principles. The operation should not be dangerous, and never will be in the hands of a careful, competent, and cleanly surgeon. An operator who feels he cannot guarantee his work against infection in such a case should not operate at all; he should seek some other outlet for his energies more suitable to his capacity.

Again, say opponents of reform, this injury does not threaten a man's life, therefore we are not justified in putting him to any risk whatever. Is danger to a man's life the greatest danger he can face, compared to which all others sink into

insignificance? Is the poverty, due to inability to labour with his hands, to which a man the victim of such an injury as that under review is inevitably doomed, of no importance? Are the persistent shooting pains, the paralysis and œdema of hand and arm of no consequence?

My object to-night will have been achieved if I succeed in impressing upon my hearers how open to reproach at present is the attitude of most Irish surgeons in hesitating to apply to the treatment of injured bones and joints the same boldness and scientific skill which they unhesitatingly apply to the head, thorax, and abdomen. I feel assured it will not be many years before we will see as great a revolution in the treatment of such cases as we have witnessed during the last twenty years in the treatment of penetrating wounds and other injuries of the abdomen, and those who come after us will look back with contemptuous pity on the unreasoning fatuity of the men of our day, who, with the light of modern knowledge shining brightly on their path, were so fettered by routine and the teaching of tradition that they shrank timidly from travelling that path, and left to another generation the glory of reaping the harvest which it should have been their pride and privilege to garner. Surely no one who has ever seen a working man with an old-standing dislocation and fracture of the upper end of the humerus will hesitate for a moment in urging such a one to face any and every risk to be relieved of his incapacity. Such cases are not commonly seen in the general hospitals, but they can be seen in abundance in the workhouse hospitals, where these poor creatures are compelled, though often yet in the very prime of life, to spend the remainder of their days through inability to earn their own living by the labour of their hands. That such a state of affairs should still exist is a reproach we should labour diligently to remove.

NOTES OF A CASE IN WHICH LAPAROTOMY HAD BEEN TWICE PERFORMED, WITH SIX MONTHS' INTERVAL, FOR THE RELIEF OF INTESTINAL OBSTRUCTION RESULTING FROM THE PRESENCE OF LARGE CONCRETIONS IN THE COLON.

By JOHN LENTAIGNE, F.R.C.S.;
Surgeon to the Mater Misericordiæ Hospital.

[Read in the Section of Surgery, November 8, 1901.]

THE case which I now bring before you is that of a little boy who has been twice on the verge of death from chronic intestinal obstruction, resulting from the presence of huge concretions in the sigmoid flexure of the colon, and who has been saved each time by an exploratory laparotomy, which revealed the cause of the disease and allowed of its removal.

CASE.—The patient was admitted to the Mater Misericordiæ Hospital on September 4th, 1899, with a history of having suffered from attacks of constipation and vomiting, with febrile disturbances, and often severe pain and distension of the abdomen, for the past two years. These attacks had become very frequent of late, and very severe in character, until the last one, which had set in five weeks before admission. Even during the intervals between the attacks the bowels had never moved except after purgative medicine had been taken. For some time past the action of purgatives and enemata had been less and less satisfactory, and had often failed entirely to give relief.

On admission the boy, who was ten years of age, was found to be greatly emaciated; his abdomen was tensely and uniformly distended, percussion note being mainly dull below the stomach area, in both flanks, but especially so in the left. There was an uncertain and variable resonance in front. No tumour of any kind could be felt. The tongue was furred, pulse 92, temperature 100° on the day of admission, normal after admission for four days, when it rose to 100° after administration of a purgative. The rectum

was empty, but at the end of the finger a hard, resisting, fleshy mass could be felt. The examination caused great pain. The diagnosis was very obscure. Chronic tubercular peritonitis was suspected—the emaciation, the abdominal pain, repeated attacks of vomiting and the distension of the abdomen all seeming to point to that affection; and this assumption was endorsed by those of my colleagues and other medical men who saw the patient with me. The prognosis of the case seemed very unfavourable, but as there was no hope of relief from anything else laparotomy was decided upon. Next day, on again examining the patient's abdomen, I distinctly felt a hard mass in the left iliac fossa. This mass was easily displaced by pressure, and could then no longer be felt. It was evidently a tumour of some kind, connected probably with the intestine, but the condition actually found at the operation was never recognised by me or anyone else before the abdomen was opened.

On September the 22nd I performed exploratory laparotomy, assisted by Dr. Blayney. On opening the abdomen by an incision in the median line no trace of peritonitis was found, but a large, smooth mass, which at first seemed like a very greatly distended stomach, presented itself. After extending the incision this was lifted out, and proved to be the large intestine enormously distended. Its contents seemed to be semi-fluid when it was examined by the hand. At its lower part, near the rectum, a hard, round mass could be felt. This mass was evidently free inside the bowel, and could be easily moved in an upward direction. I incised the gut by a vertical incision on the convex border and extracted the mass, which proved to be a fæcal concretion of the shape and size of a very large orange. I then proceeded to empty the gut and squeeze out a large quantity (two large basins full) of black, semi-liquid, clay-like fæces. Further examination showed a second mass, lower down in the gut. It was at first very difficult to get this body up out of the pelvis, but by means of pressure upwards from within the rectum I succeeded in getting it up and then extracted it. The finger of my assistant could then be reached in the rectum from the intestinal incision. I then closed the long incision in the bowel by continuous silk sutures. The bowel wall was nearly half an inch thick, and it was not easy to effectually close the opening. The bowel was returned and the abdominal wall was then sutured in the ordinary way. The patient made a quick and uneventful

recovery. On the day of the operation a large motion was passed, and nearly every day or every second day after the bowels acted of themselves. The boy gained flesh and strength rapidly, and was discharged apparently quite well on October 7th.

Immediately after the operation I cut through the larger of the two masses and found it to be of the consistence of fairly hard putty. It was black and clay-like, and was perfectly homogeneous in character, no concentric layers or nucleus of any kind being visible. I regret to say that these specimens were lost owing to the hospital porter having thrown them out with other *débris* after the operation.

On discussing the matter with the nurse who had had charge of the boy before his admission into hospital, I was told that when a small child he was said to have been in the habit of eating clay, cinders, and other such unwholesome articles; and from the black and clay-like appearance of the masses themselves and of the fæces above them I was inclined to believe that these concretions were masses of clay which had accumulated in the bowel. The lad, however, denied having eaten anything of the kind for many years. Microscopical examination of the fæces proved them to be mainly composed of vegetable *débris*.

The boy remained apparently perfectly well for nearly four months, when he again began to get thin and to suffer from constipation, with slight abdominal pain. This condition was relieved by purgatives and enemata, but the abdomen steadily increased in size, and soon occasional attacks of vomiting with severe pain would set in. The abdomen was repeatedly and carefully examined but no tumours could be felt, and it was thought, as the boy had certainly not eaten any clay or cinders since the operation, that the trouble was probably due to the adhesions in the neighbourhood of the incision.

On March 21st, 1900, the boy was again admitted to the Mater Misericordiæ Hospital. His condition then was undoubtedly worse than before the first operation. He was as much emaciated as before, and his abdomen was as tensely distended, but he was much weaker, and he could hardly retain anything in the shape of nourishment except when given in small quantities. A careful examination of the rectum was made; it was found to be empty of fæces, but a fleshy mass was felt at the tip of the finger, three or four inches from the anus. It was frequently attempted

to administer enemata by means of the long tube; these failed to bring away anything except a very little fæces, which came away on March 29th. The attempts to pass the tube caused much pain and were greatly resented by the patient. On March 30th I again opened the abdomen and found almost exactly the same conditions as at the first operation. There was no sign of peritonitis, past or present, no adhesion anywhere, but the same enormous distension of the intestines. I again incised the gut and came down on the silk suture used at the previous operation; this was taken out practically unaltered. The bowel contained the same thick, semi-fluid, black fæces; there seemed to be but little gas in the intestines. Occasionally, and as the fæces flowed out, isolated bubbles of gas or air would make themselves evident by the surface of the fæces breaking and showing cavities, exactly like those seen in Gruyere cheese. There were two large concretions similar to the first ones, but not quite so large and somewhat softer in consistence. The bowel was carefully washed out, closed, and returned as at the first operation. The quantity of fæces found above the concretions was very great indeed; several basins were filled with it, and it was black and mortary in consistence, and with little or no fœtor. Before opening the intestines I measured the circumference with a strip of sterilised bandage, and subsequently, on measuring the strip, I found it to have been a little over sixteen inches. As it seemed to me from this repeated formation of concretions that there might possibly be some strange condition of colic inefficiency, I decided to make a cæcal fistula, so that the bowels could act through it while the colon regained its natural state. I made a small incision over the cæcum, and stitched the wall of that viscus to the parietal peritoneum, with a view to complete the fistula when adhesions had taken place later on. I may mention that this step was of no benefit to the patient; owing to the absence of obstruction below it was impossible to get the fistula to act. On this occasion the convalescence of the patient was by no means as quick or as satisfactory as after the first operation. The temperature was frequently high, and the bowels were exceedingly hard to manage. Enemata had to be administered almost every day until 1st May, when the bowels acted naturally of themselves. The boy gradually became stronger, and the bowels became natural in action, and at the end of May the boy was apparently quite well and was discharged, the cæcal fistula having closed long before.

Since then the lad has remained in perfect health, and, though his bowels act regularly, he is occasionally given purgatives, but there has been no return of the constipation or vomiting, and the abdomen has no sign of distension. Some of his comrades at the school where he is, said that he was very fond of eating the fruit of the dog rose when he could get it; none of the seeds of this plant, however, were found in the concretions when they were examined. Microscopic examination of the mass proved it to be composed largely of vegetable fibre and short hairs, such as we find on the surface of many cereals, especially oatmeal.

The greater part of this paper was written some months ago, and when I had last heard of the boy he was apparently in perfect health. Quite recently, however—within the last three weeks—he was again brought under my notice, complaining of abdominal pain and distension, with constipation and occasional attacks of vomiting. On examination I found the abdomen distended, but nothing like as much as on the previous occasions. He had not lost flesh and seemed in fairly good condition. The rectum, on examination, proved to be much dilated and packed with a great mass of hard fæces. Although I was told that several enemata had been tried and proved useless, I immediately put the boy under an anæsthetic, and placed him in the lithotomy position. With the help of a Clover's crutch I then forcibly dilated the sphincter ani, and by means of a lithotomy scoop I removed piece after piece of the mass, until about six inches of the bowel had been cleared, and then, by means of a powerful irrigator, I washed away an immense quantity of semi-liquid matter, with the result that the boy's symptoms were completely relieved. Next day he felt and looked perfectly well, and shortly after was discharged from hospital, with, of course, strict directions as to the regulation of the bowels by enemata, &c.

It is well to note that this last attack differed from the previous ones mentioned, inasmuch as they followed on a number of other attacks of a similar character, each worse than the previous one. Again, in the last attack the obstruction was found to be altogether in the rectum, while on the previous occasions the rectum was quite empty, and the obstruction was found at the operations to be produced by a kind of

huge ball valve in the sigmoid flexure. I believe, however, that each time the same train of phenomena must have been in process, and that the rectum must have been the original seat of obstruction in each case, but that after a time it was followed by a formation of the hard, ball-like mass, owing, possibly, to some kind of reversed peristalsis. The masses were found to be quite freely movable up and down in the bowel above a certain point, where they completely blocked the gut; and I cannot help thinking that if the patient had been left to suffer a repetition of attacks, as in the previous instances, a similar ball-like mass would have been formed.

The emptiness of the rectum on the first and second occasions must, I believe, have been a result of the numerous enemata which were administered in the latter stages of the trouble before the boy's admission to hospital.

In clearing out the rectum on the last occasion the mass was found to be partly composed of wool and coarse vegetable fibrous material; some pieces of common twine and rag were found almost unaltered. It was only in the rectum that these foreign bodies were found. When asked what he had taken to produce these troubles, the boy confessed to having eaten rags and blanket wool. He also now acknowledged having done the same some time before each of the previous attacks, although he had always denied it up to this.

MR. T. MYLES considered the paper very instructive, as showing the difficulty of diagnosing abdominal tumours, and said that in a somewhat similar case he had seen good results obtained from olive oil injections, followed by the use of electricity, which produced free vomiting and purging.

MR. CROLY thought palliative treatment by injections might have been given a more extended trial before resorting to colotomy. He thought the second operation unnecessary, and there was nothing to indicate that it had been advantageous.

Mr. M'Ardle quite agreed with Mr. Lentaigne in the necessity for early operation in such cases; nothing was gained by delay, and it was sound surgery to operate and remove the concretion from above. He was particularly pleased with the fulness of detail with which the paper was presented.

Mr. Mitchell (Belfast) congratulated the author of the paper on finding a hypertrophied colon. In one of his cases the colon was so much attenuated that the tissue could not hold the sutures, the wound opened, and the boy died.

Mr. Ormsby gave an instance of a patient of his who ate her hair, nibbling off portions until she produced a mass of matted hair in her stomach, which he excised.

Mr. Doyle drew attention to the tendency of alimentary concretions to simulate malignant disease of the bladder. A patient of his, treated for malignant growth of the bladder, was found after death to have a healthy bladder, the trouble having been caused by an immense accumulation of charcoal in the rectum and descending colon.

Mr. Chance instanced the case of a boy who, from eating straw, formed a mass in his ileum about the size of a banana, which necessitated operation.

Mr. Lentaigne, in reply, thought that any further use of palliative remedies would have done away with all prospect of success. The operation to which he supposed Mr. Croly objected—the formation of a cæcal fistula—was not attended with any benefit, but having performed it he thought it but right to mention it. If Mr. Croly meant that the second laparotomy was unnecessary, he could only say that he was quite satisfied that if Mr. Croly had seen the boy before the second operation he would not now say that that operation was unnecessary, and, undoubtedly, it had saved the boy's life. He thought that even if the real condition had been recognised, it was doubtful whether effective relief could have been given without operation, although, of course, every effort would have been made, and, with the help of an anæsthetic, it might probably have succeeded. As it was, however, the trouble was not recognised even the second time, as the obstruction was thought to be probably due to adhesions.

THE SURGERY OF THE SKULL AND ITS CONTENTS.

By J. S. M'ARDLE, F.R.C.S.;
Surgeon to St. Vincent's Hospital, Dublin.

[Read in the Section of Surgery, December 6, 1901.]

As in the operative treatment of abdominal and thoracic affections aseptic, in contra-distinction to antiseptic, methods have led to great reduction of mortality, so, too, in dealing with the brain, its membranes, and osseous support a decided advance has been made.

Even in modern practice we often see a contemptuous disregard for the method adopted in the treatment of compound fractures of the skull, and still if we examine the cases of death from such injuries we find that most of them die from septic meningitis. If in similar fractures of the long bones it is necessary to deal vigorously with parts that have been exposed to infection, it stands to reason that in dealing with fractures which open up the diploë, and at the same time expose the dura, the most vigorous precautions should be taken in the matter first of cleansing the wound, and second in the establishment of a free exit for the products of microbic activity should serious infection have occurred. If now we add to the fracture and infection an intracranial effusion of blood or serum so likely to favour septic complications, does it not become apparent that the more thorough and radical the surgical procedure adopted the more certain will be the result?

When we come to deal with injuries of the skull in which the element of infection is absent, do we not often meet cases in which excessive intracranial tension has been

allowed to continue so long that serious brain lesions arise. In these cases why should we not work on the same lines as in the surgical treatment of over-tension elsewhere?

In cases of febrile affections how many patients are allowed to pass into a state of coma from intracranial pressure long after the general tissues of the body have satisfactorily dealt with the microbes? Why in those cases should we not relieve the brain and spinal cord of products of microbic action? Again, in syphilitic, alcoholic and other diseases which cause intracranial tension, why should we depend on medicinal derivation when the brain can be relieved at one stroke by the method which I advocate? The cases which I desire to bring before you have convinced me that the department of surgery now under consideration has been overshadowed by the brilliant results obtained in other surgical fields.

There is one thing we should insist on in the treatment of most of these cases—that is, the drainage should be thorough. Many a case that seems hopeless on the table, when so placed that cranial drainage is perfect, advances so rapidly towards recovery that one is astonished at the result. That asepsis is essential in the treatment of all injuries of the head anyone having experience of brain surgery must recognise, and it is well to remember that the brain is not tolerant of such fluids as carbolic acid and corrosive sublimate.

Case I.—W. G., aged forty, was admitted to St. Vincent's Hospital, on December 3rd, 1890, when the following history was elicited:—On Saturday, November 15th, he fell into the hold of a vessel, striking the left side of his head; he was removed in an unconscious condition to Sir Patrick Dun's Hospital, where a wound over the left eye was dressed. In a few hours consciousness returned, and he went home the same evening. The next day being Sunday, he rested, and on Monday resumed his work as coal-porter. All went well until Monday, December 1st, when he felt disinclined for work, had some sickness of stomach, and noticed

his left hand weak. During the evening of that day he experienced severe pain in the top of his head, and the weakness of the arm increased. On Tuesday, sixteen days after the accident, he found the left leg becoming powerless, and the following day he came under my care. He then had partial paralysis of left arm and leg. There was a scar over the left eye; pulse, 54; temperature, 96·5°; pupils normal, and respond to light. Although he seemed stupid he answered quickly and accurately. I had his head shaved, and the most careful examination did not disclose any external evidence of injury on the right side. It was evident from the slow pulse and subnormal temperature, as well as the paralysis, that compression of the brain was present. During the night of the 4th the symptoms grew worse, and on the morning of the 5th a convulsive attack occurred. The following note by Dr. Hickey describes this accurately:—"The fingers of the left hand contract firmly into the palm; the hand is then flexed on the forearm; pronation then takes place while the arm is being elevated straight up from the body. About this time deviation of the eyes to the right occurs, and the face soon follows in the same direction, contraction of the left side of face being marked. The arm now drops, not suddenly, but by short jerks, then the left leg works convulsively, after which convulsions become general." I saw the patient about 7 a.m.; he was in one of these fits. The laryngeal muscles were now affected; great respiratory difficulty was a marked symptom, the poor fellow becoming deeply cyanosed. I immediately opened the skull at a point corresponding to the centre of the Rolandic fissure. The dura projected into the wound, very dark in colour, and showing no pulsation. On incising it a greenish serous fluid gushed out, and on raising the membrane I found a clot the size of a shilling adhering to the inner surface. This I scraped away, and after thoroughly irrigating the parts with boracic solution, I sutured the dura matter, laid a medium-sized drainage tube across the wound, passing deep sutures to fix the scalp flap. For some time there was a copious serous oozing, which necessitated frequent change of the dressings, but late in the evening drainage seemed complete, and at 3 a.m. on the 6th consciousness returned, the patient raising at the same time the arm which had been paralysed, and saying to the nurse in charge, "Begor, I've the use of myself, ma'am."

From this time recovery was uninterrupted, and on the 14th—

that is, eight days after operation—the patient was about, the wound being soundly healed.

Case II.—R. C., aged sixteen, was brought to me by Dr. Fulham, of Swords, with the following history:—He had been kicked by a horse in the centre of the forehead. He was found unconscious in a stable, and carried to bed, the wound dressed, and stitches inserted, all this time the patient being unconscious. Consciousness returned soon after, but only for a short time; in the stage of secondary unconsciousness he was brought to St. Vincent's Hospital, where I found him in the following condition:—Unconsciousness was complete; there was a marked fulness above the root of the nose, fluctuating, and having a sharp outline corresponding to where the central portion of the fronta bone was driven into the brain. His breathing was laboured, his pulsation slow and heavy. As unconsciousness was not continuous I believed the fractured bones were loose, not exerting much pressure, and that the brain trouble was due to intracranial hæmorrhage. I trephined over the meningeal artery and removed the disc of bone which I now exhibit, showing that the artery had been torn by a sharp projection at the neighbourhood of the fracture. Under the bone, as well as beneath the dura, blood was effused, and to remove it it became necessary to take away the portions of the frontal bone which I now place before you. The large opening formed by this operation enabled me to thoroughly relieve the brain pressure. The most instructive point in this case is that the lad, who had been of a delightful temperament before, became, for some months, a veritable demon in a short time. In time this unfortunate mental condition disappeared, and he is now as you see him to-night—his old self again.

Case III.—C. H., aged thirty, sustained a fall while riding at Roscommon races. I saw him two days later in the Roscommon Infirmary; he was then perfectly unconscious and thoroughly paralysed in the left side and partly so in the right. Most of the reflexes were present, but he had lost control of the bladder. His condition improved somewhat in the following weeks, and he was brought to St. Vincent's Hospital on August 6th in the following condition:—He was half conscious, had paralysis of speech, which after a time became somewhat clearer. He had

contractions of flexors of left arm and leg, but no voluntary control of either. On October 19th I opened the skull on the right side over the hand centre. The bone was very dense and over a quarter of an inch thick. The dura was much thickened and protruded without pulsation. Incision of dura was followed by discharge of much sero-sanguineous fluid, and then brain pulsation returned. For some days there was a free flow of this fluid, after which consciousness returned, and gradually he gained power over the leg, and later the arm became useful. Since that time recovery has been rapid and permanent.

CASE IV.—L. G., aged eleven, fell while playing with his brothers, his head coming in contact with some metal steps in the garden. Immediately after the fall, and when he was apparently perfectly well, he came in to dinner. During dinner he became drowsy, and later on he was obliged to be put to bed, when vomiting set in. For some weeks he was kept under treatment, and gradually he became well except for epileptic seizures which occurred every two or three days. These fits became more violent, the frequency remaining the same until he was brought under my care two years later. His parents were hopeless, and only submitted him to surgical treatment because anything would be better than to have him grow up in the miserable condition in which he then was. At first when he came under observation it was impossible to determine the seat of brain lesion, general convulsions seemed to start without any premonitory symptom. On close observation it was found that the fit was ushered in by a deflection of the eyes to the right. After this all reflexes of muscles of the arms, especially those of the left, became marked. I opened the skull on the right side about the centre of the fissure of Rolando. When I reached the dura it bulged into the trephine wound. Incising it I gave exit to about two drachms of serous fluid, the removal of which started a characteristic convulsive seizure. I laid in a small drain and closed the wound. The lad is here to-night to prove how successful the procedure above mentioned has been.

CASE V.—E. M., aged thirteen, was brought to me from Newcastle West with the following history:—Some years before he had fallen from the top of a tier of boxes, striking his head against a wall in his descent. Some time after he became stupid, and

later epileptic seizures appeared, these increasing in frequency until he became a burden to himself and a nuisance to everybody near him, and the expression used when he was placed under my care shows how little was thought of his chance of ever becoming useful. When I spoke of the gravity of the operation which would be needed for his relief his father said, "Do what you like with him, death is better than to have him as he is." The only guide I had to the position of his brain, in which the lesion was present, was a curious symptom connected with his visual senses. He explained to me that before an attack came on he saw a circle of light in front of him, then a black cloud came down and he knew no more. In this case I opened the skull so that I could reach the angular lobe. On reaching the dura, there was an absence of brain pulsation, but on opening it no fluid escaped. I passed MacEwen's cannula through the brain substance in three or four directions without result, but on passing it inwards and backwards towards the cuneate lobe there was a rush of blood-stained serum with an oily look on the surface. I did not deem it necessary to permanently drain the cavity from which this was expelled, and so I completely closed the scalp wound. This boy had a characteristic fit on removal to bed, and now, three years after the operation, the report is that he has never had the slightest trouble since.

Case VI.—F. K., aged fourteen, came under my care on January 6th, 1901. Until eight months before he was in perfect health and was intellectually all right. He then contracted a severe attack of measles, through which he passed with some difficulty, and after some weeks of unconsciousness, when his physical strength returned, it was found that he had lost speech, and his right leg was somewhat powerless, and that his right arm was almost paralysed. Under judicious management the paralytic symptoms disappeared to some extent; his mental activity remained impaired, speech being practically absent. Believing that this was an instance of meningeal effusion, I opened the skull on the left side a little above the convolution of Broca, removing the disc of bone which I now exhibit. There was no pulsation. The dura bulged into the wound, and on incision of this a large amount of sero-sanguineous fluid escaped. There was a considerable amount of drainage during the next six days, after

which day the wound healed. Three days after the operation he was able to repeat any word one happened to mention. Ten days later voluntary speech returned, and on February 1st last, then one month after operation, he left the hospital, rapidly improving both in muscular and mental development.

CASE VII.—F. K., aged twenty-one, while riding a bicycle in the Park collided with another cyclist, and was picked up unconscious and brought to Steevens' Hoepital. Some wounds on his face were attended to, consciousness returned, and he was allowed to go home to the South Circular-road, walking part of the journey. During the night he became stupid, the next day he was unconscious, but by the judicious treatment of Dr. Patteson, of the Meath Hospital, consciousness gradually returned, and I saw him in consultation with that gentleman on June 26th; he then had complete paralysis of the right arm and leg, slight impediment of speech, and internal strabismus. The diagnosis I made was intracranial hæmorrhage, with secondary effusion, and as the boy was rapidly disimproving I ordered him to hospital, and that night opened his skull, removing the clot. This clot extended well under the base of the skull, and the greater part of it was removed by a flat scoop and flushing with a thin tube. The boy left the hospital on July 20th, and some weeks later he won a three-mile bicycle race.

In reviewing the cases which I have brought before you the most striking feature is the difference in depth of the skull as illustrated by the discs of bone exhibited. In troubles arising secondary to acute febrile or inflammatory disease it was always thickened; when, on the other hand, the affection was chronic and arising within the skull intracranial pressure seemed to materially thin the cranial wall. Several of the cases seemed to have reached a state of permanent idiocy. The result of the surgical interference you can see for yourselves in the patients brought before you this evening.

At the present moment few cases of brain trouble arising in the course of febrile affections are ever submitted to surgical treatment. The same was true some years ago of

peritoneal effusions secondary to diseases of the intestines. If surgery has done so much for the relief of the latter, why should not the former cases, when beyond the reach of medical treatment, have at least the chance of what surgery might be able to do? In all of these the chief cause of deterioration of brain power is pressure exerted on the brain substance. The removal of this pressure is therefore the chief indication.

I think the results of the cases detailed justify me in pleading for a more vigorous effort for the relief of all cases afflicted with paralytic, epileptic or idiotic troubles, such as those to which I have referred, and I reiterate the statement that it is time to apply the vigorous procedures of modern surgery, as adopted elsewhere, in all serious affections of the skull and its contents.

Mr. T. Myles thought it might safely be said that no surgeon hesitates, when necessary, to raise or remove portions of the cranial bones. Where they were now assembled excellent papers on cranial surgery for cerebral effusive pressure effects and operation on the sinuses had been read; indeed the "Transactions" of the Academy are rich in such. It is open to question if the symptoms in a case are wholly due to intracranial tension or injury to cerebral tissue. Withal it seems that death is usually due to intracranial tension rather than to cerebral injury. To trepan the skull, examine the ventricles, and tap them seems easy, but the case is not so simple when the injury results from some underlying condition of the kidney, such as Bright's disease, atheroma of the arteries, or syphilis. Some cases recover after many hours, or even days, without any operative interference; nevertheless they must acknowledge that all the drugs of the Pharmacopœia will not relieve intracranial tension. He had a case of a man who fell from a two-storey window; when seen he was quite unconscious, and there was no indication other than the unconsciousness of the accident. It occurred to him that an X-ray photograph would assist them; and it did, for it revealed a whole

series of cranial fractures. He trepanned in three places, removed a large clot, and the patient became conscious. In a case of Jacksonian epilepsy he operated, and the patient remained well for a time, but has had one fit since.

MR. SWAN remarked that Mr. M'Ardle's paper had opened for them a new line of thought as to the conditions that produce cerebral tension. From the title of the paper he thought it would have dealt with other than traumatic cases. Most persons could have acted, in similar cases, as Mr. M'Ardle did. The great difficulty in cases of intracranial tension is to locate the injury; when there is a depressed fracture the difficulty of diagnosis does not exist. A girl, who fell off a merry-go-round, came under his care with a depressed fracture of the skull. Her head was retracted; she had epileptic convulsions. He trepanned, raised the depressed portion of bone, and the girl got well, and remained so for six months; then the fits recurred. Shock appears to have the power of interrupting the sequence of the Jacksonian epileptic fits.

DR. POLLOCK said that severe cases might recover without any operative interference was known to all of them, but the following case so well illustrated this that he thought it worth recording: An Australian gentleman, when riding over his farm, met with an accident. His horse fell, throwing him, and there he lay for two hours unconscious; when he came to he found the horse lying on top of him; he used his spurs on the animal, which caused it to rise. Then he succeeded in getting on his feet, mounted the horse, and rode home, a journey of nine miles. When he reached home he became again unconscious, and remained unconscious for three weeks. There was no medical advice obtainable in the district, and advice was procured by telegraph from Sydney, two hundred miles away. After consciousness returned he had from five to ten epileptic fits daily. He went by rail to Sydney, from Sydney to London; on the journey home he never had a fit. After some time at home, finding he was free from fits, he rejoined his militia regiment, and being an excellent judge of horses he was offered a good appointment by the Government in South Africa, where he now is, and has remained free from fits since he left Sydney.

MR. H. GRAY CROLY said that when he filled the Presidential Chair of the College he had read a paper on injuries of the head,

and advocated then and now prompt surgical intervention. Some years ago he was called to see a man who fell on some spiked railings, getting a punctured fracture of the skull. On his arrival he found the patient aphasic and in the hands of physicians, who, five of them, were dosing the poor man with bromides and iodides, and refused to sanction trepanning. The gentleman left the country and went to the United States to be trepanned, and from there went to Paris, where the piece of broken bone came away before the surgeons could operate, and now he is quite well. In the case of a boy who was kicked by a mule, he raised the fractured portions of the cranial bones, and came on a large blood-clot lying on the dura mater. When it was removed the boy regained consciousness, and in a short time was quite well. The difficulty in all these cases is to find the locus of tension. He had seen alarming hæmorrhage from the ear without any sign of external injury. A man was brought to him with the history of having fallen on the back of his head; he answered in monosyllables and gradually became unconscious. Prior to death he had 250 convulsions. The autopsy revealed a broken occipital bone, with a blood-clot that covered the cerebellum. Where were you, in such a case, to apply the trephine?

Mr. Tobin had the advantage of having seen almost all Mr. M'Ardle's cases, but one must not expect the same progress in cranial and cerebral surgery as in abdominal. In the latter, one can see and handle all the viscera, but the skull opening is so small that but a limited view could be obtained of the cavity and its contents. All surgeons trepan in cases of compound fracture. But he considered that a fracture associated with soft tissues necrosed from pressure is quite as dangerous as the compound, and necessitates equal care in dressing. To another point he would call attention by an illustrative case:—A sergeant put a revolver to his head and produced a compound fracture; the wound never properly healed, the patient got epileptic fits, and a small projecting spiculum of bone was then removed. All this time there appeared no evidence of tension. The patient was placed on his side with the trepanned bone on the pillow, and during the following night there was a profuse flow of serum, after which the man made an uninterrupted recovery. There seems a dread of putting a patient on the trepanned side, which he considers is the most suitable one to allow of free exit for any fluid present.

DR. COX remarked that he was a believer in surgery, and advocated it in such cases as those referred to. He once trepanned a patient in a provincial infirmary, and removed a portion of a reaping hook from the brain of a western peasant. He also recommended trepanning of the mastoid in a case which he was consulted in; his advice was not followed. Afterwards the patient was twice trepanned, but not at the locus of the pus; finally he died. He held that cases of kidney disease or of disease of vessels are not amenable to surgical interference.

MR. LENTAIGNE said Mr. M'Ardle's paper alluded to the treatment of intracranial hæmorrhage some time after it had occurred. It may so happen that the surgeon is called in when bleeding is actually taking place from a small opening in the vessel. Mr. Victor Horsley in such cases recommends ligature of the carotid. A case of his was of this nature. The patient, a lady, had convulsions of the right leg and right arm. He made pressure on the left carotid; the convulsions ceased in the leg and arm, and the patient was able to move the leg up and down. The pressure was now discontinued, and soon afterwards she got difficulty of speech and paralysis of the limbs of the right side. By the aid of assistants pressure was now kept up for some time, and the patient recovered to a great extent the use of speech and the power of her limbs.

DR. MORE O'FERRALL would like to ask Mr. M'Ardle on the use of trepanning in intracranial tension in tuberculous meningitis, where day by day the tension increases. If we could operate there might for such cases be a chance of life. Even to open the abdomen in peritoneal tuberculosis benefits. Might it not be equally useful in tuberculous meningitis?

MR. M'ARDLE, in reply, said that on a future occasion he proposed treating of operative measures in intracranial tension of non-traumatic origin.

A METHOD OF TREATING CERTAIN CONDITIONS OF JOINTS.

By R. L. SWAN, F.R.C.S.;
Surgeon to Steevens' Hospital, Dublin.

[Read in the Section of Surgery, January 17, 1902.]

It is true that it has long been the practice of surgeons to lay open joints in a septic condition and treat them with antiseptics. Pure carbolic acid has been used, but many surgeons fear the risks of its application to the tissues. That this risk is not a light one has been well proved. I remember a case under the care of a late eminent surgeon of this city in which the application of equal parts of the lin. iodi and pure carbolic acid to an unbroken skin surface was followed by symptoms of carbolic acid poisoning and a fatal result.

Phelps, an American surgeon, has recently tried to reintroduce the practice. After a wide opening into the abscess cavity or the joint, the part is cleansed by curettement. The cavity is then filled by pure carbolic acid, which is allowed to remain for one or two minutes. It is then thoroughly washed out by alcohol. Into the wound so prepared a thick glass drain is inserted and tamponaded. Morbus coxæ was the disease for which this treatment, for which great success has been claimed, was first proposed. The fact that so large a cavity can be treated with pure carbolic acid deserves consideration.

The same treatment has been extensively adopted at the Tubingen Klinik by von Bruns, with some modifications. Those cases were obviously mixed infections, and demonstrated very plainly that with certain precautions pure carbolic acid could be used as an application to extensive surfaces without

risk. It is unnecessary to discuss the reasons of this safety. They will probably be evolved from the details of the practice which I venture to bring under the notice of the Academy. It is a means of dealing with certain conditions of joints which, if treated by ordinary and well-known methods, show a tendency either to progress to the destruction of the joints, dissemination of the diathetic elements, or in other instances to manifest an indeterminate series of recoveries or recurrences, which, by interfering with the functions of an important joint, destroys, or renders difficult, the life-work of the person affected.

The study of primary tuberculous disease of the synovial membrane accompanied by hydrops articuli first led me to the consideration of the following questions :—Why, when we have all witnessed the decided recoveries after operative interference in tuberculous disease of the peritoneum, should we hesitate to deal in a similar manner with the synovial membrane of a joint ? Are we not in a better position to deal with a joint cavity than with the peritoneum ? In the one we can immobilise or move the articulation at will ; we can also proceed in a far more radical and complete manner than with the peritoneum, enclosing as it does organs of vital moment, and in its vast extent forming recesses which it is difficult to imagine can be directly approached.

Six years ago (in 1895) a girl, aged seven years, showed the following condition :—The right knee-joint was distended and flexed at the usual angle in such cases. There was fluctuation, although pain was not complained of. She walked lame from mechanical reasons. The swelling had developed gradually in a period of ten weeks. There was no perceptible heat. No involvement of the osseous structures contiguous to the joint could, by the most careful examination and comparison, be discerned. The family history disclosed tuberculosis in near relatives. In my belief this seemed to be a typical case of primary tuberculous disease of the synovial membrane.

I confess the routine treatment for such a case had always seemed to me to be thoroughly unsatisfactory, and to witness patient after patient going from bad to worse, under the means usually adopted, made one feel humiliated. I refer to immobilisation, the application of resolvents, such as Scott's dressing or iodine, Bier's treatment, blistering, aspiration, the injection of agents to cause destruction or encapsulation of the bacilli, such as chloride of zinc or iodoform. I had tried them *ad nauseam*. I had seen, no doubt, an improvement in a few of those cases, and a partial recovery in very few, but the majority travelled by the familiar road which led to the involvement of the capsule and the surrounding parts in a gelatinous degeneration—loss of joint, or limb, or life, the result.

In the case above referred to I opened the joint by cutting across the patella, making first a flap on the skin convex upwards. The patella was easily cut through with a sharp knife and the interior of the joint displayed. It was filled with a pale, whey-like fluid containing shreds of flocculent fibrin. The synovial membrane was congested at its reflection off the cartilage, and the fringes were œdematous. I irrigated the joint for a considerable time with saline solution, and removed every loose particle of flocculent material. Having dried the surfaces, I applied pure carbolic acid with a stick to the synovial membrane, and again irrigated freely with sterilised water. I then closed the joint—suturing the patella with catgut and the skin with silkworm-gut, leaving no drain. A plaster of Paris bandage was applied over the dressings.

No trouble was ever afterwards experienced. I saw the girl at Howth last year, where she had come from the country with her friends. It was five years after the operation. It would be impossible, except for the cicatrix, to tell which knee had been the diseased one.

In thirteen cases of a similar kind in which I subsequently adopted such a course, I modified the proceeding, not thinking it necessary to divide the patella. Good access to the joint may be obtained by making an incision, convex backwards,

reaching from the lower part of the inner edge of the ligamentum patellæ to a point in the adult about two inches above the base of the patella. All bleeding having been arrested, the joint is laid open. In closing the wound three layers require adaptation and suturing:—1, The synovial membrane; 2, a layer aponeurotic below and aponeurotic and muscular above; and 3, the skin. I have not, except in one or two cases, used even artificial drains, which I think rarely necessary if the wound be dry and aseptic.

Before leaving this subject I will allude to a very common, although frequently overlooked, affection—a primary tuberculous infiltration of the bursa beneath the ligamentum patellæ. An indolent swelling, slowly enlarging, is seen to obliterate the sulci which naturally exist on either side of the ligamentum patellæ in extension of the limb. This sometimes interferes with complete extension or perfect flexion of the joint. Chances of contamination of the articulation or surrounding structures exist, or suppuration may occur. In two cases in which I removed this bursa, its walls were immensely thickened by granulation tissue, and it contained a mucoid sanious fluid in its cavity. Removal can easily be effected by freeing the ligamentum patellæ from its attachments through an incision along its inner margin, slipping it over the growth to its external side, and by means of a blunt knife and curved scissors the latter may be removed.

I will now briefly allude to other varieties of hydrarthrosis to which I have applied the same remedy. It is satisfactory to be able to prefix the term synovitis by a qualifying adjective which will indicate its pathology, such as pyogenic, tuberculous, gonorrhœal, or rheumatic. But this is not always possible. A hydrops of intractable character will be found which has arisen without obvious cause in an individual, otherwise in perfect health, has lasted for months, or even years, unaltered by treatment. There is no history of illness

at the time of its invasion, no gonorrhœa, no enteric, no evidence of rheumatism, injury, small-pox, scarlatina, syphilis or diphtheria. How do we explain its incidence? It is all conjecture. Such a case is the following, of which, through the kindness of my colleague, Dr. Haughton, I am able to show a picture.

I. T., a native of Roscrea, aged forty-three years, a coachman by occupation, was sent to me by Dr. Cooke. About two years ago, without any recognised cause, his knee began to swell. He never had any illness. His knee had been repeatedly blistered, and various liniments had been applied. A slight diminution of the swelling, he believes, occurred subsequent to the blistering, but he thought the enforced rest had a good deal to do with the improvement. He now suffers from a weakness of the limb, which interferes with his occupation. Even for the few days he had been in hospital his knee is reduced considerably in size. I operated on him some weeks ago in the manner before described. On opening the joint it was found to be filled with a straw-coloured liquid. This was saved to the extent of about ten ounces. It was full of albumen and became a solid mass on exposure to heat, showing that it was probably a transudate and not an exudate. The interior of the synovial membrane presented a very rough appearance due to the presence of a number of small growths, some sessile, some peduncular. I removed as many of those as I could reach with curved scissors; they were not vascular. I then used the pure carbolic acid and irrigation in the ordinary way. This man left hospital about ten days ago.

HYDROPS AFTER ENTERIC FEVER.

I. C., a soldier in the 2nd Bedford Regiment, was invalided very early in the South African Campaign with enteric. He had been incapacitated for five months with a large hydrops of left knee, and had, according to his statement, but three months left to rejoin his regiment or leave the service. I operated on him in March, 1901. Unlike some hospital patients, which, no doubt, some of us have met with, this poor boy had a generous anxiety to acknowledge his obligation, and wrote me two letters. I will read a sentence from each one. Date, May 16th: "You will be

glad to hear my knee is keeping very well." Another, dated August 16th: "I am about to embark again for South Africa this month. My knee has quite recovered."

J. S., aged twenty-six years, Roscommon. Hydrops of left knee. Operated on in Steevens' Hospital. Left for home well in six weeks. Cause obscure, ascribed to a wetting.

Jane M., aged twenty-two years, an enormous hydrops of left knee, which had been indolent for eight weeks, but had lately taken on more acute features, with some pain and temperature. I suspected the presence of gonococci in this case, but our pathologist could find no positive evidence in the fluid removed. I used a very rigorous cleansing, and passing my fingers into the joint, evacuated its posterior regions and stripped the crucial ligaments and interior of the synovial membrane of a gelatinoid exudation before the application of the acid. She made a perfect recovery, and has now complete use of the joint.

Enough has been said to show that the proceeding, were it not even invariably followed by good results, is at least safe. My chief aim, as it was my primary idea, is to demonstrate the efficiency of dealing by this method with tuberculous hydrops not associated with disease of other parts than that in the synovial membrane. I admit the differential diagnosis is not always easy, as in many cases the joint affection by its prominence obscures the osseous focus which was its originator. I think, however, that uncomplicated primary synovial tuberculosis is more frequent than is the opinion of most writers on the subject.

Mr. T. Myles was accustomed when a student to look on a knee-joint as the most dangerous cavity in the body. Even now he thinks the old humoral pathology exerts a certain influence on our practice. He quite agreed with Mr. Swan that the proper treatment for such cases is opening the joint, and by so doing the pathological lesion will be made plain. In the majority of cases it consists in pedunculated growths commencing from the alar ligaments. If on opening the joint, especially in children, he

found the synovial membranes to be tuberculous, he recommends that they be dissected out, a procedure which he believes leads to recovery.

Mr. E. H. Taylor objected to section of the patella. It leaves two raw osseous surfaces apt to be infected by tubercle, if any there be. He prefers Kocher's method; the flap gives room enough to examine the joint. Free swabbing with strong carbolic acid devitalises the synovial membranes and the cartilage, and leaves them a prey to the tubercle bacilli in their vicinity. He looks on the method suggested as one not well calculated to give good results in hydrops articuli; the wound heals, but after a little time the limb becomes shorter and often flexed. There is not true ankylosis. He recommends that the hyaline cartilage be shaved off the bone and the raw osseous surfaces be joined, ensuring a sound limb.

Mr. H. G. Croly said that, as he understood Mr. Swan, the paper dealt with chronic synovitis, such as they so commonly meet with after an acute attack. They were not dealing with the treatment of tuberculous or other forms of knee-joint disease by excision; but the question was the treatment of hydrops articuli. He had seen good results from aspiration in such cases, and he had seen rest give good results. Many cases, he believed, call for such treatment as Mr. Swan suggests; but he would not approve dissecting out the membranes and slicing off the hyaline cartilage.

Mr. Tobin's experience was not quite in accord with that of Mr. Croly. He tried the rest cure with hydrops articuli for months without getting any good results. He looks on the thick, pulpy synovitis—Brodie's pulpy degeneration of the knee-joint—as tuberculous synovitis, though in specimens submitted to microscopic examination no bacilli were found. The result of opening the joint and dissecting out the membranes is sometimes very good, and at other times very bad. Long-continued effusion has stretched the ligaments, and they are unequal to the strain of active life. Favourable cases give good results with movable joint, but the more uniformly good results are obtained by ankylosis following excision.

Mr. Johnston said that his experience of synovitis was not fortunate. He admitted a man with hydrops articuli which improved for a time under the rest treatment, but the swelling did

not wholly disappear. He opened the joint, irrigated it, and closed it. The fluid removed, about ten ounces, was examined and found to be highly albuminous. Dr. O'Sullivan found that the synovial membrane contained bacilli in large numbers. His incisions, one on each side of and parallel to the patellar tendon, healed quickly and well; but they broke down in a week, and not long after the patient developed tuberculous meningitis, of which he died.

Mr. Haughton said that surgeons should no longer be in doubt as to the condition of the osseous tissue in tuberculous disease of the knee-joint, as the Röntgen rays give a clear representation of any rarefaction of the tissue that may be present.

Mr. Lentaigne asked Mr. Swan to describe his method. He had been for years using strong carbolic acid (absolute phenol) in different cavities of the body—tuberculous joints, after erasion and after incision, and tuberculous sinus, &c.—without seeing any evil effects from its use. As a student he had frequently met cases of carbolic poisoning; now he never sees one, although much larger quantities of carbolic acid are employed. He ascribes this to the carbolic acid they now get being pure; the toxic action was probably due to some impurity. He swabs out cavities with a very small sponge, held in a sponge holder, and well wet with the liquefied carbolic acid, and he has had no reason to regret it in any case. Mr. Swan's operation might prevent the need for arthrectomy or excision.

Mr. Doyle would like to know how Mr. Swan applied the carbolic acid; applying it on a swab was a most dangerous method. In children he has had bad results from operative interference with the synovial membranes of the knee-joint. The results are good for a month or so, but in three or four years' time they are found to be greatly deformed. Kocher's method gives great facility for examining the joint. He found the locus of infection to be at the attachment of the crucial ligaments.

Mr. Swan said that he did not deal with excision or erasion in his paper. He had no concern with them. The object he had in view was to show the possibility of opening the joint, removing the fluid, and allowing the synovial membrane to return to its normal condition. Latterly he has not been in the habit of cutting through the patella, but he cannot see the difference, as far as infection is concerned, between a cut in hard and one in soft tissues.

Puncturing is perfectly safe if carried out aseptically. The subcrureus bursa was not mentioned by him simply because it communicates with the synovial sac, and in all operations on the joint must be dealt with. This is not the case with the bursa under the patellar ligament, consequently he referred to it. He cannot agree with Mr. Tobin that portions of cartilage and bone are readily removed during the subsequent attempts at passive motion. Mr. Johnston got very bad results, but he took no precaution to avoid them; no bactericide was used, and the subsequent attack of tuberculous meningitis was a result that he thinks might have been anticipated after a tuberculous joint was opened. Tuberculous dissemination, as Owen pointed out, was, under the circumstances, a not infrequent sequence. He cleans out the joint with an aseptic loofah, and applies the carbolic acid with a stick. He is not wedded to carbolic acid; any equally powerful bactericide would answer quite as well.

A SUCCESSFUL CASE OF PYLORECTOMY: PERFORMED IN TWO STAGES.

By T. E. GORDON, M.B., F.R.C.S.;
Surgeon to the Adelaide Hospital.

[Read in the Section of Surgery, January 17, 1902.]

OPERATING surgeons are by no means agreed as to the best method of performing pylorectomy, and some look with disfavour on the operation generally. Under these circumstances it seems right that operators should record their results, and thus add weight, however small, to one or other side of the balance.

A man, aged forty-three years, had suffered from vague gastric symptoms since August, 1899. Pain was never severe; vomiting was not constant, and for some time before coming to hospital he vomited very seldom. Since Christmas last his general health began to fail, and he lost one and a half stones in weight. He came to the Adelaide Hospital in April, and was placed under the care of my colleague, Dr. Wallace Beatty. A tumour was found in the abdomen, just above the umbilicus. It measured about three inches in transverse diameter, was hard and irregular, and could be felt to move readily with respiration. One could move the tumour remarkably freely; thus it could be pressed to the upper parts of the epigastrium, downwards, so that its lower margin was below the umbilicus, and to the right side well into the right hypochondrium. A divided Seidlitz powder was given, which demonstrated a moderate degree of dilatation of the stomach below the growth. There was no liver enlargement, and this fact, together with the remarkable mobility of the tumour and the man's condition of fair general health, led us to hope that we might find an absence of adhesions, and of secondary cancer deposits.

On April 2nd, 1901, I opened the abdomen somewhat to the

left of the middle line. After making a hasty examination of the tumour, which seemed to justify the hopes we had entertained, I turned upwards the transverse colon and performed a posterior gastro-enterostomy. I made the stomach opening as far over to the left as I could, and the method adopted was that of Roux. In this operation, it will be remembered, the jejunum is divided some distance from the duodenal flexure, the lower end is fixed to the stomach opening, and the upper end (of the cut jejunum) is made to anastomose with the jejunum again some four inches or more from the stomach junction. I used simple suturing throughout. The gastro-enterostomy completed, I closed the abdomen, leaving the pylorectomy to be performed when the man should have recovered from this first operation.

After operation the course of the case was satisfactory. There was little or no shock, and he only vomited once, as he was recovering from the anæsthetic. I gave liquid nourishment, such as barley-water and whey, on the day following the operation, and he was able to take solid food by the ninth day. In rather less than three weeks I sent him for one week to a convalescent home.

On April 27th—*i.e.*, twenty-five days after the gastro-enterostomy—I again opened the abdomen. This time I made the incision to the right of the first one, and almost in the middle line. The incision was an ample one—quite five inches long. There were some slight adhesions behind the scar of the first operation, but they did not materially interfere with my work. When the stomach region was exposed my first step was to make an opening in the lesser omentum, through which I passed my finger to explore the posterior aspect of the tumour, and then to act as a guide in the division of the great omentum. This division was effected by cutting between pairs of Kocher's clip forceps. I now placed one Doyen's clamp forceps across the duodenum. I was unable to get on a second, for the readily available duodenum—*i.e.*, that within the lesser peritoneal sac—was very limited in extent. I cut across the duodenum; very little leakage occurred from the pyloric orifice, and then, at once, I sewed up completely the opening of the duodenum by two rows of silk sutures. This done, I cut the stomach across between clamps placed well beyond the apparent limits of the growth. The opening in the stomach was also sewn up by a double row of silk sutures. In closing the abdomen I left in the area of operation a gauze drain. Hæmorrhage during the

operation was very small in amount, with the exception of a small bleeding which took place owing to the slipping of a ligature on the pyloric artery.

The operation lasted almost an hour and three-quarters.

The excised portion of stomach showed a considerable narrowing of the pylorus by a growth which proved, on microscopic examination, to be a columnar-celled cancer. The tumour ended abruptly on the duodenal side, but its limits in the opposite direction appeared to the naked eye less definite. However, microscopic sections failed to demonstrate any cancer in the wall of the stomach at the level of the duodenum.

For some days after the operation the patient remained in a very precarious state. His temperature on the second day was 102°, and his pulse was on one occasion as much as 160. On the fourth day a considerable discharge of bilious fluid occurred from an opening at the lower end of the first incision; but the general condition of the patient had materially improved. At the end of the first week, however, he seemed to be losing ground. I decided, therefore, to risk a considerable increase in the amount of food taken by mouth, and I found he could take four pints of peptonised milk without any discomfort. Steady progress began and has continued. On June 22nd the patient weighed 9 st. 4 lbs.; on July 21st, 9 st. 10 lbs.; on October 6th, 9 st. 10 lbs.; and on Nov. 27th, 10 st. 2 lbs. He now feels well and strong, and is able to do some work every day. The biliary fistula has never completely closed, but this is probably due to the separation of the silk sutures which have from time to time been extruded from the fistula.

On July 1st, 1902, I received a satisfactory account from the patient. He now weighs 10 st. 8 lbs. No bile has escaped from the fistula for the past nine weeks. His temperature is normal, his bowels act regularly, and he is able to work all day.

REMARKS.

Although there are many points in this case which call for criticism, I propose to confine my remarks to the consideration of one question, which, while it is of fundamental importance, its answer is unfortunately still open to serious doubt. "Is pylorectomy under any circumstances legitimate?" In an

endeavour to answer this question we must take two things into consideration—

1. The immediate mortality.

2. In case of survival, the prospect of long-delayed recurrence or perfect recovery.

Some years ago the mortality was overwhelming, and even now we must regard pylorectomy as, perhaps, the most dangerous operation in all abdominal surgery. Still, if it can be shown that the operation holds out a reasonable prospect of ultimate success we need not be deterred from giving this chance to the patient through fear of its 30 per cent. mortality. Unfortunately in the very large majority of cases recurrence takes place, and that early. On the other hand, we find from year to year an increase in the number of recorded cases where patients have lived, or are still living, two, four, and even seven or eight years after the operation. How, then, shall we answer the question we have put before us? Is it sufficient to meet this 30 per cent. mortality and, let us say, 80 per cent. recurrence within three years, with the defence that the disease without operation is incurable, and hence each life saved is as a brand plucked from the burning? Or, again, may we find comfort and justification in the reflection that pylorectomy is still in its infancy, and that the better results of these later years suggest hopefulness for still further improvement? My own impression is that if we cannot thus reasonably look forward to a better general record at the end of the next ten years than can be shown for the past ten, this operation is as certainly doomed as is splenectomy for leucocythæmia, or thyroidectomy for exophthalmic goître. I believe, however, that we may be hopeful, and I will devote the remainder of the time at my disposal to-night to a consideration of the lines along which we may look for improvement. The subject may be divided

under two headings. First, improvement in selection of cases; second, improvement in operative technique.

1. *Improvement in Selection of Cases*:—I am convinced that pylorectomy should be employed only in cases which appear, when the abdomen has been opened, to be absolutely favourable. Where the patient's general health and strength have been wrecked, where there are enlarged glands beyond the immediate vicinity of the growth, or where there are adhesions, the surgeon ought either at once to close the abdomen, or, if necessary, to perform a gastro-enterostomy. It may be said, "one never sees cases so perfectly favourable," to which I would reply, "Then, in Heaven's name, never perform pylorectomy."

It is a fact which should be thoroughly grasped that cases suitable for this operation are exceedingly rare, and they will continue to be so until physicians recognise it as a duty to submit doubtful cases to an exploratory laparotomy. At the same time, let us be reasonable in our judgment. Can we expect either physicians or patients to be enthusiastic while the results of pylorectomy are such as they are at present? Moreover, there is surely a limit to the application of exploratory laparotomy? With the present uncertainty of diagnosis it is clear that if physicians were to yield as they have been urged to do there would be performed many negative explorations. It may be that but little harm would thus be done to the individuals operated upon, but might not a very serious harm result to abdominal surgery generally?

So much for selection of cases. Let me now draw your attention to the operation itself.

The operation which I performed may be taken as an example of a pylorectomy in which the open ends of stomach and duodenum which result from the excision of the pylorus are sewn up, and a new exit is provided by a gastro-enterostomy. This method has, it seems to me, several advantages.

In the first place, with it recurrence of the cancer does not necessarily include recurrence of obstruction, for the opening between stomach and intestine is far removed from the area of disease. Again, the gastro-enterostomy will remain equally easy of performance whether the amount of stomach excised be great or little, of course within certain limits. This is a matter of no small importance, now that surgeons have begun to apply to pylorectomy the same principle which guides them in, let us say, amputation of the breast—*i.e.*, to carry their incision or dissection far beyond the apparent limits of disease. On a liberal application of this principle depends mainly the prospect of improved *ultimate* results in this operation, and it is because the method of operation we are considering *facilitates extensive excisions* that I have thought it right to give to it this prominent attention.

I wish now to say a few words concerning the advantage of performing the operation in two stages. The principle which underlies it is that of substituting for one very dangerous operation two of lesser risk. The method is comparatively new, and the number of recorded cases small, but it has already the support of many of the best operators, and the results have been remarkably good. This change in technique aims at a reduction of the mortality of pylorectomy, and if it attains this end the first step towards better things will have been accomplished.

There remain many points of detail in my operation which will suggest criticism, but I have thought it best to confine my remarks to broader questions.

In concluding, let me briefly summarise—

1. The present position of pylorectomy is unsatisfactory, but there is no cause for despair.

2. That an advance may be made, it is, in the first instance, necessary to *reduce the immediate mortality.* This is to be

done by (1) a more careful selection of cases, and (2) by performing the operation in two stages.

In the second place, it is necessary *to obtain better ultimate results.* The way to this end lies in (1) wider resections, and (2) in this case also in better selection of cases.

3. Let these things be accomplished and we may then, with more justice than at present, call upon physicians to resort more frequently to exploratory operation.

MR. T. MYLES begged to heartily congratulate Mr. Gordon on the first successful pylorectomy performed in Dublin. The difficulty of diagnosticating tumours of the stomach was very great. In one of his cases he cut down on the viscus with the intent of doing a pylorectomy, but found so much thickening of the gastric walls by what he and his friends thought was cancer that he returned the stomach unopened to the abdomen, and the woman is to-day, after some years, alive and well.

MR. SWAN congratulated the author of the paper on his great success.

MR. E. H. TAYLOR drew attention to the anatomical condition found in the duodenum close to the pylorus. Surgeons before beginning a pylorectomy would do well to examine the duodenum.

MR. G. JAMESON JOHNSTON spoke, and

MR. GORDON replied.

A CASE OF SWALLOWING OF A METALLIC DENTURE SUCCESSFULLY TREATED BY THE INTERNAL ADMINISTRATION OF COTTON-WOOL.

By G. JAMESON JOHNSTON, M.A., M.B., F.R.C.S.;
Visiting Surgeon, Royal City of Dublin Hospital.

[Read in the Section of Surgery, February 28, 1902.]

There are certain points of interest in the history, physical examination, and treatment of the following case which have prompted me in bringing it before the Academy:—

T. M., aged twenty years, was bathing at Blackrock on the evening of August 9th last. When nearly half a mile out he put up his arms with the intention of sinking to the bottom. On reaching the surface again, he was struck in the face by a wave, and immediately after found himself choking. His attempts to swim by a breast stroke being futile, he turned on his back and succeeded with some difficulty in reaching the shore in this posture. He called for assistance, and informed some bystanders that he had swallowed his artificial teeth; he was then conscious of the plate being stuck in the back of his throat, but had no difficulty of breathing. An individual who was assisting him struck him sharply on the back, when the plate changed its position and brought on a dyspnœic attack, rendering him "black in the face"; he was slapped on the back a few more times, with the effect of relieving the breathing, though he suffered great pain. Dr. Flood saw him, and advised his removal to hospital. The patient states that during the journey to town the jolting of the car caused the plate to go further down his throat, and that the seat of the pain became situated lower down.

I saw the patient soon after his admission to hospital, and found him in a very exhausted condition, pale and in a cold perspiration; he had no difficulty of breathing, but complained of severe pain, which he referred to the lower end of his sternum; neither digital exploration of the pharynx nor palpation of the neck revealed

anything abnormal. I gave him a teaspoonful of milk to swallow, and the act was so painful he begged not to be given any more. I then passed a sponge probang without any appreciable resistance into his stomach. The passage of the instrument was evidently painful, and the probang returned smeared with bright blood. He expressed himself considerably relieved—in fact the relief was so marked and maintained as to suggest the possibility of the plate having been pushed from the lower end of the œsophagus into the stomach.

When the possibility of the plate not having been swallowed was spoken of, the patient asserted positively that it had not been ejected, and was certainly swallowed. As there were now no urgent symptoms I reassured the patient and put him on 5m. doses of liq. morph. mur. every three hours, with the double object of allaying the pain and minimising peristalsis. He suffered much pain on Friday night, all day on Saturday and throughout Saturday night; the pains, however, ceased early on Sunday morning. The pains were paroxysmal in character, and occasionally very violent. There was, on Saturday, a distinctly tender spot approximately over the pylorus. I watched carefully for signs of gastric peristalsis, but was unable to discover any, owing to the rigidity of the abdominal wall during the attacks. On Monday I was supplied with a wax model of the plate. The saw-like edge where the plate fitted against the posterior surfaces of the natural teeth, and the rather formidable (from an intragastric point of view) clasps for holding the plate in position, naturally suggested the question of gastrotomy. However, I decided to wait and administer cotton-wool. Accordingly I ordered bread and butter sandwiches to be prepared with a thinly teased outlayer of cotton-wool in each; the patient relished the idea and the sandwiches and partook of them as freely as I permitted. I made no accurate estimate of the actual amount of cotton-wool used, but had in my mind a rough calculation of the amount which might possibly cause obstruction.

Dr. E. J. Watson kindly went to a great deal of trouble in examining the patient with the Röntgen rays, and notwithstanding that an extended examination was made on three successive days with the most recent apparatus, no indications of the plate were seen. The screen showed most distinctly metallic buckles and buttons through the whole thickness of the body. I can offer

no explanation of the failure of the skiagraphic examination further than that the plate was in the small intestine and the peristalsis prevented the plate remaining sufficiently long in one position to be recognised.

Nothing of interest supervened until the following Friday—that is, a week after his admission—when the patient was again seized with paroxysmal pains, this time referring them to the right iliac fossa. Without any leading question the patient stated that he was distinctly conscious of the plate being in that region and changing its position. Palpation over the ileo-cæcal valve caused the patient to wince and complain of pain. The pains were not nearly so severe as in previous attacks, and only lasted two hours.

His bowels not having been moved since his admission, I considered it safe to order some aperient, and he was given about ʒss. of liquorice powder. Next morning (Saturday) he had a motion, which was examined with negative results; three hours later his bowels were again moved quite painlessly, and the plate was seen to be enveloped in an admixture of cotton-wool and fæces; the cotton-wool was easily removed from the left side of the plate where the clasps are not very prominent, but it required some little effort to remove it from the other side, where the large clasp was completely entangled in the wool. I regret that it is not possible to exhibit a photograph of the plate in the condition in which it was passed, as the enthusiasm of the nursing staff resulted in the plate being restored to me as clean and polished as when it left the hands of the dental practitioner who made it.

The patient left hospital next day, and has been perfectly well ever since.

The plate weighed ninety-five grains, and measured four centimetres long, by one and a half wide; affixed were two teeth, the right lateral incisor and canine of the upper jaw, a long clasp for the right first bicuspid; there were indentations for the right central incisor, the two left incisors, and a short clasp for the left first bicuspid.

One can practically read the progress of the plate in the history. It would seem that the plate at first stuck in the back of the pharynx, and remained there until the patient reached the shore, as there was no obstruction to respiration.

The slaps on the back which the patient received apparently caused the plate to change its position and press on the glottis, causing great difficulty of breathing with cyanosis and prominent eyeballs; renewed slapping relieved the dyspnœa, the plate slipping down into the œsophagus, where it seems to have remained until he reached hospital. The location of the referred pain—namely, the lower end of the sternum—and the practically instantaneous relief given by the passage of the probang, leads me to assume that the probang pushed the plate into the stomach, where it remained until Sunday morning. The passage through the small intestine lasted until the following Friday—the paroxysmal pain in the ileo-cæcal region pointing to its passage through the ileo-cæcal valve; the laxative given hastened the passing through the large intestine, which was terminated next morning.

I have already given the only explanation I can of the negative results of the Röntgen ray examination.

The treatment adopted in this case was not original, but is not, I believe, as widely known and appreciated as its obvious merits entitle it to be.

Mr. Lentaigne confessed he would not like to take cotton-wool under any circumstances. He thought it would not be without risk of producing obstruction. He considered the case important, as it impressed the well-known danger of small dentures on their notice. All the accidents resulting from artificial teeth getting into the pharynx are due to small dentures, which, he thinks, should be prohibited, for a large plate can be made for any case calling for artificial teeth.

Mr. Tobin would like to know if all the cotton-wool the patient swallowed was passed with the denture.

Mr. G. Jameson Johnston did not know the amount of wool either taken in the sandwiches or passed with the denture, the nurses having cleaned the latter before he saw it.

SUPRAPUBIC PROSTATECTOMY.

By EDWARD H. TAYLOR, M.D. (Univ. Dubl.), F.R.C.S.;
Surgeon to Sir Patrick Dun's Hospital;
Examiner in Surgery, Royal College of Surgeons.

[Read in the Section of Surgery, February 28, 1902.]

After some introductory observations and a descriptive account of the development and general anatomy of the prostate, illustrated by a series of lantern slides, Mr. Taylor proceeded to consider the pathology of senile enlargement of the prostate.

PATHOLOGY.

The pathology of senile enlargement of the prostate opens up a wide field, and is a subject which I can only allude to on the present occasion in a cursory manner. It is especially deserving of notice that the changes which the prostate undergoes are not, as a rule, by any means uniform, but differ very much in different cases. It is possible, however, to distinguish *two main forms of enlargement*. In one the prostate is enlarged as a whole, in the other the enlargement is of a partial character. In cases of general enlargement the organ may reach an enormous size, so as to occupy a large part of the lower pelvic region, and to be readily detected, on digital examination, from within the rectum as a large, firm mass, the peripheral limits of which cannot be completely defined. In some cases the tissues of the prostate contribute in equal proportion in its enlargement—a general hyperplasia, in fact, but this is probably rare. More commonly there is a predominance either of the fibro-muscular or glandular elements. The glandular form is probably the most frequent; it may constitute almost the entire mass of the growth. The newly-formed gland tissue takes the form of

encapsuled adenomatous tumours, round or oval on section, and quite distinct to the naked eye. As the prostate enlarges, the lateral lobes encroach upon the urethra internally, narrowing its lumen from side to side, so as to reduce it to an antero-posterior slit. In addition, they expand the muscular cortical zone and the outer fibrous investment of the prostate often to an extreme degree. As these changes are taking place, the ducts of the seminal vesicles and the prostatic tissue by which they are surrounded are not unfrequently pushed aside in a downward and backward direction. I have already alluded to the normal prostatic area of the bladder floor, and have shown how it is related to the basal aspects of the lateral lobes and of the middle lobe on each side of, and behind, the urethral orifice. Now, in well-marked examples of general prostatic enlargement, such as are represented by the specimens which, by the kindness of Professor White, I exhibit to-night, it will be seen that the appearances presented from within the bladder are evidently due to a general uprising of this prostatic area. The lateral lobes in the course of enlargement rise upwards and bulge into the bladder cavity as rounded or knob-like projections, connected below by a broad base of attachment with the main mass of the prostate. The enlarged middle lobe lies between the lateral lobes, but is separated from them by deep grooves, which converge in front to the urethral orifice. This middle lobe, as already noted, has a great tendency to obstruct the opening; it usually presents a sessile attachment to the floor of the bladder, but in some rare cases it is attached by a pedicle, and under such conditions has a marked tendency to fall forwards and occlude the urethral orifice after the manner of a ball valve. *The greatly increased degree of curvature* which the urethra acquires in cases of enlarged prostate is to be attributed, no doubt for the most part, to the hypertrophic changes which take place in the middle lobe, as the result of which it rises up so as to over-

hang the urethral orifice, or to jut from behind forwards against it as a rigid wall. The enlargement of the middle lobe occasionally takes the form of a *transverse bar*, or ridge, stretching across the bladder floor immediately behind the urethral orifice.

A general enlargement of the prostate, due to an increase in its fibro-muscular element, is sometimes observed. The organ may not reach a very large size, but it is important to note that its consistency is very firm and tough. It is with this form that the enlargement of the middle lobe shows a tendency to assume the form of a dense bar behind the urethral orifice, to which I have just alluded. Another important fact relating to this fibro-myomatous type of enlargement is that *it does not lend itself to enucleation* in the same way as the glandular form. Should the attempt be made it will almost certainly be attended by very great damage, and perhaps fatal consequences. A fair estimate of these fibro-muscular enlargements may sometimes be obtained by the finger in the rectum, but this is not by any means a reliable method of diagnosis.

So far I have been speaking of general enlargement of the prostate. In the other group to which I have referred the enlargement, instead of being uniform, is greatly accentuated in some parts. It is by no means uncommon, for example, to find the middle lobe enlarged out of all proportion to the other divisions of the prostate, or one lateral lobe may so enlarge as to greatly exceed the other. The result of this irregularity is that the prostate is not only enlarged, but it is also distorted, and for this reason, as one might expect on *à priori* grounds, obstruction to the urinary outflow is by no means unfrequently a marked feature of the symptomatology of these cases. It is brought about mainly by the obstruction at the vesical orifice through the agency of the enlarged middle lobe.

SURGERY.

With this brief *résumé* of the pathology of senile enlargement of the prostate, I shall now proceed to consider its operative treatment, in so far as it lies within the scope of my paper.

To put the matter within as narrow a compass as possible, I should say that the aim of suprapupic prostatectomy should be :—

1. To remove *en masse,* and by a process of enucleation, those portions of the enlarged lateral lobes which lie beside the urethra and exert a compressing influence upon it.

2. To remove the enlarged middle lobe in the same manner, seeing that its action in a large percentage of cases is to obstruct the bladder outlet.

3. To render as level as possible the prostatic area of the bladder floor, so that it may occupy the same plane as the area which lies immediately behind it.

I consider it advisable to put the patient on special treatment for a few days beforehand, with the object of improving the urinary condition, cystitis being a frequent complication in these cases. The bowels, too, are carefully attended to, the large intestine being thoroughly emptied.

OPERATION.

The bladder is washed out, and it is well to flush out the rectum also with a stream of sterilised water, these preliminary procedures being conducted by an assistant. About 12 ozs. of weak boracic solution are injected into the bladder and allowed to remain; a large-sized Lister bougie is introduced and retained *in situ.* The patient is now placed upon a low operating table in the Trendelenburg position; the bladder is exposed in the usual way and opened by a vertical incision. The finger is introduced and the condition of the prostate examined, the shape and consistency of each lateral lobe resembling very much that of the cervix uteri. The bladder is

now secured by four temporary *silkworm-gut sutures* to the parietal wound. This, I find, is a wise precaution, as it prevents fluids making their way into the loose peri-vesical tissue during the later manipulations. Access to the prostate through a suprapubic opening is much facilitated if an assistant introduce *two fingers* into the rectum and press the prostate upwards and forwards. During the enucleation process I regard this indispensable, for in addition to bringing the field of operation well into view, the prostate is firmly supported and does not recede before the finger. The enucleation is carried out in the following way :—An incision about three-quarters of an inch in length is made over the most prominent part of one lateral lobe; through it the index finger is introduced and the process of enucleation commenced. The mass is freed outside and in front, and also behind; it is then peeled away from the urethra, and throughout the entire procedure the greatest care should be taken to avoid all rough manipulation and tearing of tissues. When once the finger comes into contact with the periphery of the growth, its enucleation is not a matter of great difficulty—at least I have not found it so. The enucleation of the mass which causes enlargement of the middle lobe can be effected through one of the lateral incisions. During the concluding stages I find it facilitates matters greatly to introduce one or two fingers into the rectum, and to carry out the intra-vesical manœuvres with the other hand. The finger too within the rectum serves as a guide and enables one to judge of the depth of tissue which intervenes.

Hæmorrhage is sometimes free, more however in the form of a parenchymatous oozing than from individual vessels of large size. I usually treat it by a stream of hot sterilised water. When the enucleation has been completed, the bladder wound is closed, with the exception of its lower angle, through which

a wide rubber tube is introduced for the purpose of affording subsequent drainage.

In conclusion, I would briefly summarise the more important facts which strike me as being worthy of consideration in connection with suprapubic prostatectomy :—

1. It is an operation from which good results may be expected in suitable cases. By these I mean cases in which the enlargement is due to encapsuled masses, especially of the adenomatous type. When the enlargement affects the prostatic tissues in a more or less general manner it is evident that an attempt at prostatectomy such as I have described will result in failure. It is well adapted also to cases in which the enlargement is mainly confined to the middle lobe, whether it be due to an adenomatous or a fibro-myomatous growth.

2. It is doubtful if the operation should as a rule be attempted in very old men, if their vital powers have reached a low ebb, and in whom it is probable that there is grave organic renal disease associated with chronic cystitis of long standing.

3. In the absence of severe cystitis, and provided the patient's general health is fairly good, the suprapubic operation which I have just described may be employed without obvious risk.

4. In prostatectomy, as in other operations of an extensive character, it is desirable that the various steps of the procedure be carried out in as expeditious a manner as possible, consistent of course with safety and efficiency. It is an operation in the performance of which a definite policy can be followed, and becomes much easier in proportion as one acquires familiarity with its details.

5. Suprapubic prostatectomy, as practised at the present day, remains in its essential features the operation of M'Gill and of the Leeds School. It aims at enucleation of encapsuled growths, and meets all the requirements of the case.

Within a comparatively recent period the claim put forward by Freyer for "total prostatectomy" has been largely discussed, and widely divergent opinions have been expressed as to its feasibility.

Were total extirpation of the prostate carried out, what would it mean? It would of necessity involve the removal or extensive laceration of the prostatic urethra, to which there adheres, even in the most marked cases of enlargement, a certain amount of the prostatic fibro-muscular tissue, and which remains connected with the ducts of the seminal vesicles. These, as I have already shown, in cases of enlarged prostate, are displaced downwards and backwards with their surrounding tissue, and are to be regarded as important supports of the prostatic urethra after the enucleation process has been completed.

Total extirpation would also imply the detachment from its surroundings of the outer fibrous investment of the prostate and of its thinned cortical muscular layer. Now this would not only be a totally unwarranted procedure, but in the highest degree dangerous, as it would inevitably mean the laceration of the veins of the prostatic venous plexus, which lie in close contact with—embedded I might say—in this outer fibrous layer, which Freyer regards as the true prostatic capsule. As a matter of fact, this fibrous layer is very tough, and it is very fortunate that it is so; whereas, on the other hand, the encapsuled adenomatous masses are of a much softer and more friable consistency. The result is, that when the finger is introduced through the incision in the bladder floor, it finds its way, following the direction of least resistance, between the outer tough fibrous investment of the prostate or its very thin and expanded cortical layer and the encapsuled mass. This is really the true explanation of the ready manner by which the enucleation of enormous tumours may be carried out. I quite realise that very little prostatic tissue may be

left behind after the process of enucleation has been completed. In such a case the index finger in the rectum may fail to detect any evidence of the organ whatever, all sense of resistance having disappeared, but nevertheless it would be incorrect to say that the prostate had been entirely removed.

MR. T. MYLES congratulated the Section on the two most interesting papers they had just heard read. Mr. Taylor's was of surpassing interest. He placed his facts very clearly before them, and by his caution *re* extirpation he gave them great satisfaction. The operation is not generally applicable; it is possible in a few cases only. Cases in which the kidneys are diseased and the urine is purulent are not suitable for enucleation. An artificial pouch containing unhealthy urine in the immediate vicinity of the prostatic plexus is not a desirable condition. Where the urine is non-purulent and contains a normal amount of urea, and the patient is not too old or too feeble, the operation is applicable. In some of his cases he decided on suprapubic drainage. But the subject was one tempting to criticism, one on which a surgeon might talk for hours. He considered the operation much superior to perineal incision, from which he had seen a patient bleed to death.

MR. HENRY GRAY CROLY congratulated Mr. Tobin on his practical paper and Mr. Taylor on his anatomico-surgical paper, though he thought we were not so much indebted to German anatomists for our knowledge of the anatomy of the gland, as they had really added nothing to Alcock's description. We had, however, in the treatment of prostatic hypertrophy made great progress. A patient is no longer kept for hours in suffering whilst a catheter is being passed, and now patients do not die of uræmic poisoning from an over-distended bladder, as he had once seen occur.

MR. G. JAMESON JOHNSTON, in a case of marked hypertrophy of the prostate, which involved the whole gland and was readily recognised through the rectum, performed castration with good results. Mr. Taylor's splendid demonstration made it clear that the whole prostate could not be extirpated.

Mr. Tobin was thankful to Mr. Freyer for having so written as to produce Mr. Taylor's excellent paper and lantern demonstration. From *à priori* reasoning it might appear that the operation was dangerous, but the good practical results showed that in spite of the reasons the operation was a valuable one. To the question, "Is the case fit for operation?" he would reply by asking, "Is the case fit to die?"

Mr. Taylor felt sorry if he had roused Mr. Croly's indignation by not referring to Alcock's monograph, which he was aware had anticipated the German anatomists. Cases selected by him for operation are carefully fed, purged the day prior to operation, and he tries beforehand to bring their urine to the healthiest condition possible, urotropin in ten grain doses being very useful for this purpose.

TREATMENT OF SENILE HYPERTROPHY OF THE PROSTATE.

By R. F. TOBIN, F.R.C.S.;
Surgeon to St. Vincent's Hospital, Dublin;
Examiner in Surgery in the Royal College of Surgeons, Ireland.

[Read in the Section of Surgery, February 28, 1902.]

A SPECIAL interest in the diseases of the male genito-urinary apparatus was early carried in upon me by the large number of sufferers from such affections under my care while in charge of the Surgical Division, Royal Victoria Hospital, Netley. This interest has grown with the kind consideration given by this Academy to papers of mine on urethral stricture and prostatic disease. It is therefore that I venture to occupy your attention to-night with a few remarks on the treatment of senile hypertrophy of the prostate. The note of triumph we can now sound over this once terrible enemy of old age makes the task before me a pleasant one. The advance has been so rapid that it is within the personal knowledge of most of us. At present the position may be said to be this—palliative treatment has made great advances. Our knowledge of how to keep the urine aseptic and the excellent catheters now manufactured have made this mode of management both safe and easy; but this, notwithstanding the advance of radical treatment, has been so great and so satisfactory that one can safely advise it, if catheter life is in any way uneasy.

It is of radical measures that I am about to speak to-night—prostatectomy, vasectomy, and orchidectomy. I wish to define as far as I can the position of each of these operations, and in order to do so it is necessary to say a few words on the functions of the testicles and prostate and the correlation of

these organs. As to the functions of the testicles physiologists are pretty clear. As to those of the prostate they are exceedingly vague. I have looked in vain in works on physiology for answers to the questions—of what use is the prostate?—is it, or is it not, an essential part of the sexual apparatus? But surely some answer is necessary; or it is at least well that we should get as near as we can to an answer, before proceeding to discuss measures that interfere seriously with that organ. I am ill qualified to throw light on the subject; but nevertheless you must bear with me while I give expression to definite and dogmatic views, for I hold that "truth comes more easily out of error than confusion," and I wish to promote discussion of this most important matter. I venture, therefore, on the statement that the prostate is an essential part of the sexual apparatus, and that in its absence sexual desire and sexual activity are non-existent.

My reasons are—firstly, that the gland in question is found practically in all animals, and that its size is found to bear a direct relation to sexual desire and sexual power; secondly, does not clinical experience tell us that when in man there is a true hypertrophy of the prostate sexual desire is increased? Do not patients suffering from this condition complain of desire that is excessive, that goes beyond, if I may so speak, the requirements of the situation, beyond the secreting power of the apparatus? On the other hand, when by any disease the prostate is destroyed, desire and action cease. The testicles may retain their secreting power, but to no purpose. Erection and emission no longer occur.

I found this statement on the evidence of many cases, but I shall quote only two. A soldier, who had received a bullet wound that carried away the greater part of his prostate, and was under my care at Netley for a urinary fistula, the bladder emptying itself into the rectum, but whose genital organs were otherwise complete, told me that his sexual passions,

which had rather dominated him previous to the injury, were subsequently not existent. No. 2.—A fairly robust man, aged fifty-eight, consulted me lately for urinary trouble. He stated that as his urinary trouble came on his sexual desires ceased. There was an enlargement of the prostate, probably adenomatous, and causing, by pressure, atrophy of that gland. The testicles were healthy, except that the right contained a small spermatocele, which on being tapped yielded fluid containing numerous active spermatozoa.

For further evidence I would refer you to two of the cases recently published by Mr. Freyer, to whom, however we may differ from him on some points, we all owe a debt of gratitude for his demonstrations of the practicability of the cure of a large class of prostatic enlargements by enucleation. The cases I refer to are two, in which patients reported a recovery of sexual power subsequent to the operation of enucleation to which he had subjected them. Now, as I do not wish to enter into the vexed question of the nature of these operations, I shall at present address myself only to those who believe that when after the operation of enucleation the prostatic urethra is left intact, then the prostate, compressed and atrophied, is also left behind, and that adenomatous masses only have been removed. For such as hold these views, the two cases referred to will, I have no doubt, uphold my contention as to the use and function of the prostate. They will see that coincident with the gland being compressed sexual feelings and powers are in abeyance, and that these feelings and powers return on the pressure being removed. Such occurrence is in accord with what has happened in a case that has come under my own observation; but it seemed to me better to elucidate the point from cases so widely known as are those of Mr. Freyer.

It is not possible in a brief paper such as this to do more than indicate the kind of evidence on which I have founded

the views I have ventured to express. Whether they are true or false is, however, all important, and I shall be most grateful for any criticism that will either substantiate or disprove them.

If they are correct, cases of the disturbance under consideration fall readily, both clinically and pathologically, into two classes; and the indications for treatment in each class are clear. First, those in which there is a true hypertrophy of the prostate, with increased activity of its functions; second, those in which the enlargement is due to adenomatous or other non-malignant formations under the pressure of which the prostate has disappeared, and with it what I have declared to be the uses of that gland.

It is to the first class of cases that I believe vasectomy and orchidectomy to be applicable. To such interferences all men have a natural objection; but this, notwithstanding a little consideration, brings us back to them as the proper procedures. For who can study the exhaustive statistics and tabulated cases published by White and others without being convinced that these operations are efficacious as regards the urinary trouble, are safe and simple, and when performed on men of mature years are followed by none of the changes that characterised them in the case of young subjects. Remember we are now talking only of old men with abnormal sensual appetites. Surely for them, apart altogether from their urinary troubles, repose of the sexual apparatus is indicated. But even if this were not so, what is the other alternative?—complete removal of the prostate. Whether such removal is possible without including the prostatic urethra I shall not pause to consider (my impression is that it is not). I shall content myself with pointing out the great danger of the operation, and the fact that if the prostate is an essential part, the patient is as completely unsexed as if the testicles were removed. Except in urgent cases I think

vasectomy should be tried before having recourse to the orchidectomy. It is true that in many cases it fails without apparent cause. And on referring to experiments on animals with normal prostates I find the same uncertainty—viz., that in some cases complete atrophy and in others no change at all occurs (*vide* the report by Mr. Athanason in the Paris *Journal of Anatomy and Physiology*, March and April, 1898). Seeking for an explanation of this physiological discrepancy, I was lately struck by the fact that the nerves of the prostate came from the hypogastric plexus, while the nerves of the testicle (I quote from Gray) "are the spermatic plexus from the sympathetic. This plexus is derived from the renal and aortic plexus, joined by filaments from the hypogastric plexus, which accompany the artery of the vas deferens."

From this it would appear that if in the division of the vas deferens these hypogastric filaments were included, there would be an interruption of nervous communication between the prostate and testicle, and perhaps in the division and non-division of these filaments may be found the explanation of the success and failure of the operation under consideration.

For the second class of cases the operation of enucleation as described by Mr. Freyer is an ideal procedure. The patient is not maimed in any way. An offending growth is removed, and on its removal the parts are free to return to their normal state. It is an operation not difficult of performance, and as a rule the shock and hæmorrhage resulting are small. Let me give you as an instance particulars of a case recently exhibited by me here :—

A. B., aged eighty-five, with whom the use of a catheter had ong been necessary, was sent to me, at St. Vincent's Hospital, with great distension of the bladder, by Dr. Cosgrove, of Kilcock, whom I know to be one not easily foiled in passing a catheter. On arrival he was delirious, and his temperature was 101°. I

had him taken at once to the theatre, and I opened the bladder above the pubis.

I found the prostate, especially the right lobe, much enlarged. He made a good recovery, except that a fistulous opening remained. The dribbling through this caused much irritation of the skin, and he complained of it as a grievous trouble, and as he was a poor old fellow who had no changes of clothes or anyone to look after him, I agreed with him that it was so. Accordingly I took him again to the theatre one day, and enlarging the fistula, enucleated the enlargement in the way Mr. Freyer has described. You see that even as a dried specimen it is of considerable size. On section it is seen to be an adenoid growth. There was a fair amount of hæmorrhage, but with the help of suprarenal extract it was readily controlled. On going to see the patient in the ward some hours after the operation I was shocked to see the sheet drawn over his head. My feelings were changed, however, when on taking it down I found him enjoying a surreptitious smoke. I showed him here a month or so after the operation. He was then able to empty his bladder completely during the day, but unless he was awakened during the night it became distended, and in the morning it was necessary to pass a catheter.

A report to-day from Dr. Cosgrove informs me that even this trouble has passed away, and that he has now normal continence of urine and normal micturition.

This case fully illustrates what an admirable operation is enucleation for the class in which adenoid growths are the cause of the enlargement.

The further question remains is there a third class—cases in which at first a true hypertrophy exists, and in which, later on, there occur adenoid or other growths owing to the pressure of which the original condition disappears. To this question I can give no answer. I have met no case throwing light upon it. I therefore leave it to you together with the more important one, on the answer to which all scientific interference must hang—Is the prostate an essential part of the sexual apparatus, and what is its true function?

ON THE LIGATION OF THE EXTERNAL ILIAC ARTERY FOR ILIO-FEMORAL ANEURYSM AND OTHER TUMOURS.

By HENRY GRAY CROLY,

Senior Surgeon to the Royal City of Dublin Hospital;
Consulting Surgeon to the Monkstown Hospital;
Past-President of the Royal College of Surgeons.

[Read in the Section of Surgery, April 4, 1902.]

I WISH to bring under the notice of this Section of the Royal Academy of Medicine three cases of ligation of the external iliac artery—one performed recently for ilio-femoral aneurysm, the other two to facilitate the removal of malignant growths in the groin and to safeguard the patients from sudden and fatal hæmorrhage. Before detailing the cases, and in order to make the subject of my communication more interesting, instructive and practical, I shall refer as briefly as possible to the surgical anatomy of the external iliac artery with special reference to the relation of its accompanying vein, the surrounding sheath, the position in which the branches are given off, and, in my opinion, the proper site to select for the application of the ligature to the artery.

The external iliac artery takes an oblique course downwards, outwards and forwards, indicated by a line extending from the left of the umbilicus to the centre of Poupart's ligament. Its length is from three and a half to four inches; it lies on the psoa-iliac aponeurosis and psoas muscle. The peritoneum covers the artery completely above and on its inner side through the greater part of its course. The ureter, especially at the right side, dips into the pelvis, internal to the artery, close to its origin.

The external iliac vein, at the crural arch, is internal to the artery, and nearly on the same level and *separated from the artery by a septum.* As the vein ascends it is internal and gradually becomes posterior to the artery, and lies on a plane internal to the pelvis, its outer edge looking somewhat upwards and outwards; still higher the vein gets posterior, and lies in the interval between the bifurcation of the common iliac into external and internal iliac. The genito-crural nerve lies to the outer side of the artery, sometimes enveloped in the sheath, and at the lower part of the artery the genital branch passes in front of the artery.

The artery and vein are invested by a cellular membrane—fascia propria or subperitoneal fat, also called Abernethy's fascia; it is joined to the fascia iliaca at either side of the vessels, and I have *demonstrated a process of the sheath or fascia propria passing between the artery and the vein so that the artery can be ligatured without the vein appearing.* One or more oblong lymphatic glands are situated close to, or anterior to, the external iliac artery near its termination, and where it is crossed by the spermatic vessels, also by the circumflex iliac vein. The artery at the right side has the termination of the ileum and the cæcum in close relation. The external iliac artery gives off no branches of importance until within a quarter or half an inch of its termination. It then gives off from its outer side the anterior or circumflex iliac, and from its internal or anterior surface the deep epigastric artery. It is therefore quite obvious that the *lower portion of the artery should not be selected for tying.*

ILIO-FEMORAL ANEURYSM.

Case.—P. K., aged forty-two years, residing near Dublin, driver of bread cart, served as gunner in the Mounted Train Battery, Royal Artillery, for eight years, during the Egyptian campaign; had syphilis twelve years ago. Cicatrix in left groin where bubo was opened; has been a moderately hard drinker.

Except for the illness alluded to he enjoyed good health. Consulted me in April, 1901, for a swelling in his right foot, leg and thigh, which he attributed to jumping up and down off bread cart. He said the swelling commenced in his ankle and gradually went up his leg and thigh to his groin. On examination of the affected limb it was swollen not unlike phlegmasia alba dolens. There was no pitting on pressure. No glandular or other swelling in groin. There was an erysipelatous blush on the front of the leg. He was placed in one of the observation wards; limb elevated; warm boric stupes applied. The swelling gradually disappeared, and he was sent to the Convalescent Home, where he remained a fortnight, and then feeling quite well he returned home on May 17th, resumed his work on the bread cart, exactly one month from the day I first saw him. The day after he resumed his work he felt a stiffness in his right groin, and as he did not get relief from resting at home he came in to see me on June 3rd. I examined his groin and limb, and found nothing except a slight enlargement of the thigh. He was again admitted into the Convalescent Home, where he remained resting the limb for twelve days. June 17th he came in to consult me, when I at once detected an ilio-femoral aneurysm. At that time all other swelling had left his leg and thigh.

Treatment.—He was placed in a very comfortable bed. Tufnell's diet and iodide of potassium were prescribed and carried out. A flannel bandage was applied from the foot to the knee and an ice-bag was applied to the tumour. Perfect rest and instrumental and digital pressure got a full trial. The tumour, which occupied about the circumference of a small orange, gradually enlarged, pulsated strongly, and there was a very distinct *bruit de souffle* heard over it. The patient carried out all instructions in a most praiseworthy way.

The patient was naturally anxious, as indeed I was, to give the treatment by rest, pressure, diet, and medicine every trial before resorting to operation. The tumour, as seen by the cast, extended from the pubic spine close to the crest of the ilium, and extended downwards below the origin of the profunda femoris; it could be felt dipping into the pelvis. I was out of town for a holiday during September, and on my return I was pleased to find the tumour much firmer at the circumference, and smaller. The patient's health was excellent. He did not suffer in any way

from the long confinement to bed, and at no time did the skin become irritated, as the part was kept constantly shaved and dusted. At one time in October the aneurysm showed signs of being cured, but the pulsation returned as forcibly as ever, and then the patient expressed a strong desire to have the operation performed. I operated on October 31st.

I weighed carefully in my mind all the facts of the case—the possibility of the aneurysmal tumour extending into the pelvic cavity, and the artery being diseased high up. The operation known as Abernethy's I never liked; the one modified by Sir A. Cooper I thought unsuitable for the case. I therefore decided on an incision like the one made for removal of the vermiform appendix to give plenty of room to go high on the artery, and if necessary to ligate the common iliac.

The skin wound was not deepened in the vicinity of the internal abdominal ring, and the deep epigastric therefore was not endangered. The fascia transversalis was opened to the outer side of the "deep ring"; the internal oblique and transversalis were separated low down; the cæcum and small intestine were drawn up by means of a broad spatulæ made specially for Professor Hargrave's case of ligation of common iliac (at which I was his chief assistant). When the intestines in the unwounded peritoneum were drawn well up I saw the aneurysmal sac dipping into the pelvis. The whole length of the external iliac artery enclosed in its sheath was exposed; not a drop of blood was seen, and the parts looked so like an operation on the dead body that I said so at the moment (on looking into various papers since my operation I find that Sir Philip Crampton made a similar remark at his operation on the iliac artery).

The external iliac in its strong sheath *did not pulsate*. I placed my finger on the vessel and felt its pulsation. I raised portions of the sheath with a fine pointed forceps, and cleared with a small scalpel a sufficient space to allow a long-handled aneurysm needle to pass round the artery from within outwards. The *vein was not seen*, and no nerve came into view. The needle was threaded with ox peritoneum (goldbeater's skin), the loop being held; the needle was withdrawn, the loop divided, leaving a double ligature under the vessel. The ligature on the cardiac side was tied first by first half of reef knot; the artery, which was very large, but *normally soft*, grooved like a director as I *approximated* (*by*

Scarpa's method) the *internal coats* of the artery; the second ligature was then tied in a similar way, then the two ends from each side, treated as a single ligature, were tied, thus completing the stay-knot of Ballance and Edmunds. When the first knot was tied all pulsation in the aneurysm ceased and never returned. The tumour, though silent, *did not alter in size*, showing that there was a very considerable amount of fibrin deposited in the sac, the result of pressure and rest.

The patient bore the operation well, and for about four hours after his removal to bed he complained of a numbed sensation in his foot. That passed off, and he never complained of any discomfort afterwards.

The patient, who made an uninterrupted recovery, was in attendance, and inspected by the members. There is no tendency to hernia. Photographs and casts of the case, taken before and after operation, and original drawings by Dr. Paul Carton, showing the *relation of the artery and vein* with SEPTUM, were also exhibited.

Through the courtesy of Professor White, curator of the museum, three casts were taken by the museum porter. The first shows the size and extent of the aneurysm, the second shows the change after operation, the third shows the present condition of the limb.

When the trunk of the external iliac artery is ligated the limb is abundantly supplied with blood by the branches of the internal iliac which leave the pelvis. The gluteal transmits blood to the femoral artery through the internal and external circumflex branches of the latter. The sciatic transmits blood to the femoral artery by the internal circumflex and perforating arteries, and to the popliteal through the cava nervi ischiatici. The obturator supplies the femoral through the branches which communicate with the internal circumflex, and the pudic artery supplies the femoral by its communication with the pudic branches of the latter.

Examination of limbs where the cases ended fatally showed

the portion of the femoral artery below the origin of the profunda to be normal. The portion between the ligature and origin of the profunda was normal or reduced to one-half its size (case of Sir Astley Cooper).

The case just detailed of spontaneous ilio-femoral aneurysm is full of interest, and the highly satisfactory termination is, in my opinion, in no small degree attributable to the preparatory course to which the patient was subjected—namely, perfect rest, Tufnell's diet, digital and instrumental pressure, which gave time for fibrinous deposition in the very large sac and the establishment of a free collateral circulation.

The tumour was so much under the control of pressure on the inguinal portion of the artery that I was not altogether without hope that by *diminishing* the current of blood in the trunk of the artery, so as to favour the coagulation of the contents of the sac, a cure *without operation* might be effected; at all events it was obvious that by giving time to the collateral arteries to be dilated the success of the operation would be rendered less uncertain.

"The cases of popliteal aneurysm" (says Todd, *vide* Dublin Hospital Reports, Vol. III., 1820) "are chiefly related with a view of recommending a more general adoption than is at present practised of a preparatory course previously to operation."

I can scarcely doubt but that in many cases of aneurysm in which operations have failed from mortification of the limbs succeeding, the patient might have been saved by a delay sufficient to allow some progress to be made in establishing the collateral circulation; and I feel confident that this desirable object may be promoted in most instances of recent disease situated at a sufficient distance from the trunk by compressing the principal artery of the limb for a few hours every day for a period which must vary according to the circumstances of the case.

CASES OF LIGATION OF THE EXTERNAL ILIAC ARTERY AS A PRELIMINARY TO REMOVAL OF MALIGNANT GROWTHS FROM THE GROIN.

CASE I.—A young man employed in a butcher's shop in Baggot-street came under my care suffering from a melanotic sarcoma in the groin. I laid bare the external iliac artery by Sir Astley Cooper's incision, ligatured the external iliac and deep epigastric, finding the femoral artery in the centre of the growth. I tied that artery also below the profunda and removed the entire growth. The circulation in the limb was thoroughly established. The patient subsequently developed melanotic growths over his abdomen and chest, and sank from exhaustion in some months.

CASE II.—A young man was admitted into hospital last year under my care suffering from a large watery ulcer of cicatrix on his leg. I removed the limb above the knee and the stump healed. In a short time the glands in the vicinity of the saphenous opening became enlarged and were excised; a large growth soon followed. I ligated the external iliac artery, and cleared all the growth from the groin and pelvis. A fresh growth was rapidly developed at the opposite side. The patient was admitted into the Royal Hospital for Incurables, where he died a few months since from exhaustion.

The following truly sad case led me to decide on ligating the external iliac in malignant growths in the groin:—

A young clergyman from the country consulted me some years ago for an ulcer on the prepuce, which I at once pronounced to be malignant; the growth was removed, and the part healed satisfactorily. The patient returned home and resumed his duties; in a few months he returned to town with a glandular enlargement in his groin. I removed the glands; the wound healed, and the patient returned again to his duties. In a few months he returned to consult me, and I was horrified to see a huge mass of cancer occupying the groin and dipping into the pelvis. I advised the unfortunate sufferer against any further operative interference. This opinion was confirmed in consultation with a late distinguished senior member of the profession.

The patient remained near town, where I saw him occasionally. Small bleedings occurred from time to time. One day I was sent

for in great haste, and when I got to the house I found the patient dead; sudden arterial hæmorrhage flooded the bed.

I at once made up my mind if I met such cases again to ligate the main artery on the same principle as I adopt in tongue cancer, of cutting off the main blood supply and prevent sudden death from hæmorrhage.

HISTORY OF THE OPERATIONS ON THE EXTERNAL ILIAC ARTERY.

Mr. Abernethy is said to have been the first surgeon who tied this artery (in the year 1796) for femoral aneurysm. He had previously tied the femoral on the distal side of the aneurysm (Bradsor). Severe secondary hæmorrhage set in on the fifteenth day. He made an incision over the course of the artery. He experienced much difficulty until the fascia which covered the artery and vein was opened. In his second case he made his incision not over, but a little external to, the artery. Both cases ended fatally. In 1806 Abernethy had a successful case. Mr. Abernethy's operation was condemned at the time as a rash and useless operation, whilst some disbelieved that it was ever put into execution. Mr. Abernethy's cases showed that it was an operation highly justifiable, and he afterwards had the gratification of seeing it successfully practised.

Freer, of Birmingham, performed the operation in 1806; Tomlinson in 1807 and 1809; in 1811 Kirby, of Dublin, had a successful case. He is said to have experienced the same difficulty from the fascia as Abernethy. Sir Astley Cooper, in 1814, had seven cases; four were successful, three died.

The external iliac artery has been tied in Dublin by Todd, Wilmot, William Henry Porter, Houston, and Bellingham.

Dupuytren lost his case by wounding the epigastric artery; Béclard by tying immediately below its origin.

Travers' well-known case was lost in consequence of the ligature having been placed on the artery between the epigastric and circumflex ilii. In 1810 the external iliac was

tied for the first time in France by Delaporte, of Brest. The patient died. Goodlad had a successful case in 1811, and Dorsey, of Philadelphia, another in the same year. In 1812, Bouchet, of Lyons, operated with success. The same year Albert's case died of tetanus. Mr. Norman and Mr. Brodie had each a successful case in 1813, and Lawrence in 1814. Mr. Samuel Cooper states that out of twenty-five cases gangrene occurred in three—one of Sir A. Cooper's; second, Bouchet, of Lyons; the third, Mr. Collier's. Arendt tied both external iliacs in succession, with an interval of eight days only between the operations, and was successful.

Erichsen disposes of the subject of ligation of external iliac in a few words—gives no history of the operation, and only performed it once; the patient died of hæmorrhage on the same day.

In regard to the obliteration of the iliac artery, certain facts were known at an early period of the last century. Gualtain and Scarpa's injections clearly established that although a ligature had been previously placed on the external iliac artery, the coloured fluid passed freely into the arteries of the thigh and leg.

Cases in which the external iliac may require to be ligated :—

1. Aneurysm of the femoral or popliteal artery.
2. Ilio-femoral aneurysm.
3. Wound of the artery (as in Velpeau's case).
4. Secondary hæmorrhage in compound fracture.
5. To facilitate the removal of tumours in groin.
6. And avoid sudden death from hæmorrhage in cases of malignant tumours.

Velpeau records a case of a young man, aged seventeen, who inadvertently stabbed himself in the groin while cleaning a table, opening the external iliac artery transversely immediately above the epigastric. The artery was tied and the patient recovered.

The following are the principal dangers in performing ligature of the external iliac artery :—

(1) Puncturing the peritoneum in the extra-peritoneal (Sir A. Cooper's method); (2) wounding the epigastric artery; (3) wounding the spermatic cord; (4) wound of circumflex iliac vein.

Chief dangers after operation :—

(1) Secondary hæmorrhage (especially if the operation is performed low down on the artery); (2) gangrene; (3) peritonitis.

Mr. T. Myles had listened with much pleasure to Mr. Croly's very interesting paper—interesting from both its anatomical and its clinical aspects. He quite agreed with Mr. Croly in selecting a site some distance from the deep epigastric artery for ligation; but he was not so sure that the secondary hæmorrhages which were so common in the past were due to the site of ligation. The *locus in quo* did not account for everything. The good result was no doubt partly due to the better site of ligation chosen by Mr. Croly; but there was something more—to-day we had aseptic methods—aseptic ligatures, aseptic handling of the wound. He would like to hear from Mr. Croly how he prepared the ligatures; also if he found the pulse of the posterior tibial in the limb operated on soon after the ligation. When we think of the care taken by surgeons to-day to ensure aseptic conditions, and recall the methods of the past, we can only ascribe the successes of the older surgeons to the providential mercy of God.

Mr. L. H. Ormsby felt that they should all be very much obliged to Mr. Croly, one of their senior surgeons, for taking the trouble of coming there and describing to them his operation. He had never had an opportunity of tying the external or common iliac artery; but if he should be called on to perform such an operation he would adopt Mr. Croly's methods and be well satisfied if he obtained equally good results.

Mr. Lane Joynt by the reference to the old surgeons and their methods was reminded of a painting he saw not long since on the wall of a house in Pompeii, which represented a surgeon in the

act of cutting down on the femoral artery in Hunter's canal. The line of incision was that followed by Hunter.

MR. LENTAIGNE thought that perhaps the older surgeons were too much blamed. He looked on secondary hæmorrhages as the result of sepsis—sepsis by silk ligatures and ligatures of other absorbent material, which retain septic matter in close union with the arterial wall, so that it soon becomes infected. All this was carefully avoided to-day with the excellent and brilliant results which they had just heard from Mr. Croly.

MR. CROLY, in reply, stated that he prepared his ligatures by leaving them for twenty-four hours in ether and then placing them in a solution of carbolic acid in water, of a one in twenty strength. He looked upon the fear of wounding the peritoneum as the reason the older surgeons tied the external iliac so near its distal end. This fear paralysed their action in cases of wounds of the deep epigastric and internal iliac arteries—they looked on wounds of the peritoneum as necessarily fatal, and rather than open it they left patients to die of internal hæmorrhage. He (Mr. Croly) did not divide the muscular tissue by his incision; on coming down to the muscle tissue he pushed the fibres aside with his fingers and readily exposed the artery. He failed to find the posterior tibial pulse either after the operation or since, though, as was seen, the man makes no complaint of any want of circulation in the limb.

CASE OF DOUBLE RESECTION OF THE INTESTINE FOR INJURY.

By R. LANE JOYNT, F.R.C.S.;
Surgeon to the Meath Hospital.

[Read in the Section of Surgery, May 9, 1902.]

N. C., a youth, aged sixteen years, was brought to the Meath Hospital at 7 p.m. on Nov. 13th, 1901. At the time of his admission he was very collapsed but conscious, and shortly after was able to give a very distinct account of the accident he had met with, and this tallied in every particular with that of a friend who was along with him, and of an onlooker.

When riding his bicycle through the Coombe, returning from his work as an engineer's apprentice, he took both hands off the handles of his machine to settle the lamp. He did not in consequence observe a van driving towards him; his friend shouted to him to look out, and just at this moment, as he raised his head, his forehead was struck by the horse and the shaft of the van hit him in the abdomen. He was carried for a few yards on the shaft and then thrown by its rebound clear of the car, the wheel of which did not pass over him; he was laid on the footpath by some men, and although dazed never lost consciousness. He stated that he only felt winded. The accident occurred about half-past six; he was in hospital at seven o'clock, and was at once seen by the house surgeon, Dr. C. K. Bushe, who found him in a great state of collapse, pulse weak and thready, and about 70. There were no marks visible on any portion of him, but Dr. Bushe, realising the grave nature of the injury, immediately telephoned for me. He was seen by me twenty minutes later. By this time some reaction had set in; he became warmer and more able to talk, and vomited. There was no blood in the vomit, which was very scanty, owing to his hungry condition. The pulse became full, and was now 70; he complained of violent pains at times above the umbilicus; this at first occurred in paroxysms, but afterwards was more or less continuous. I made a complete examination of

him, but could find absolutely no mark on him; liver dulness was not absent; there was no dulness in the flanks; no rigidity of the muscles was noticed, and there was nothing remarkable about the belly. He passed water of his own accord; it was free from blood, and rectal examination revealed nothing. He was positive that the shaft struck him above the umbilicus, and that he was not hurt anywhere else, and mentioned to us that he had recently recovered from a fractured patella.

In consultation with Mr. Ormsby, the Vice-President of the College, it was decided to operate as soon as possible; but as the boy's parents resided at Sutton, and as we considered that it would not be detrimental to await their arrival, I had an opportunity for watching the pulse-rate, which in this case was very instructive. It rose in frequency, steadily, five beats in increase in every half hour. While on admission at seven o'clock it was 70, by half-past ten, when the operation was commenced, it was a little over 105.

The patient was anæsthetised with ether by Dr. Bushe. I opened the abdomen in the middle line below the umbilicus, subsequently extending the incision above it and to the left. An enormous quantity of liquid and discoloured blood escaped. I at once allowed the intestines to escape, and found that portion of the jejunum was completely torn away from its mesentery for a distance of over 18 inches, the rent in the mesentery extending to its root. In the angle of the tear, a cylindrical clot, the diameter of a pen handle, projected from the torn end of a vessel and pulsated with it. I at once secured this with a ligature. Immediately above the rent was another tear clean through both gut and mesentery, and the upper torn end of the bowel had a hole punched through it about one inch above its free end. I removed the part of the mesentery between the two rents, together with the bowel affected, cut the upper end through the healthy bowel, and united them with a Murphy's button. Previous to this I whip-stitched the torn edge of the mesentery, afterwards suturing the two edges together; this I considered advisable to secure any torn mesenteric vessels. I now examined the remainder of the intestines, explored the recto-vesical pouch, the under surface of the liver and stomach, and discovered in the transverse mesocolon another hole through which three fingers could pass. The dependent colon had at this point been so stretched that the muscular coat and bands, together

with the peritoneum, had been completely burst open, leaving an exposed tube of mucous membrane intact. This I excised, removing a clear inch on either side. I sutured it by Cheatle's method, using a single layer of silk through-and-through sutures in the first instance, and Lembert sutures to close the longitudinal cuts. During the operation the abdominal cavity was kept free from blood, and cleansed at the same time by douching with hot saline solution. The boy's condition by this time was very grave; his pulse had risen rapidly to 140. I was forced, therefore, to complete the operation as quickly as possible, and on this account it was not as neat a job as is customary after ordinary laparotomies, but except for the appearance of the wound and a little delay in union it did not make any material difference. A gauze drain was left in and removed forty-eight hours later. The whole operation lasted two hours. The pulse-rate slowly fell; on the fifth day the temperature rose to 101·8°, unaccompanied by any rise in the pulse-rate; the lower bowel was washed out, and eight hours later a copious motion was passed normally. The Murphy's button was passed on the seventeenth day, and the patient made a steady recovery.

The total length of bowel removed, measured without stretching, was twenty-four inches, three inches being transverse colon, the remainder the jejunal portion. This amount, as Dr. Blayney points out in an admirable paper read recently before this Section of the Academy, does not in any material way affect the general nutrition, and in my case the boy seems to be at the present time as well as ever. Nor does the removal of two feet seem very heroic when compared with the cases Dr. Blayney quotes of four to eleven feet, but, as far as I am aware, multiple resections are not numerous, and present some interesting points. For instance, I had put in the Murphy's button before I found rent No. 2. Would I have been justified in putting in a second button? In point of time it would have been a distinct gain. I may add the sewing took me nearly twice or three times as long as the buttoning. However, former discussions here led me to think the button less suitable to the large intestine, where, in a patient just previously in full vigour and health, it might be stopped by fæces, and again in buttoning the bowels one cannot guarantee which button may separate first, and it is quite possible one might block the other.

Of the after-treatment I may mention that for the first three

days he was fed on nothing but milk and hot water, then nutrient enemata were added; about the fifth day I substituted raisin water, but this was abandoned as it seemed to have a tendency to purge the patient. For the first eight days he suffered a considerable amount of pain, which came on in spasms, sometimes waking him from sleep, but quickly vanishing on his being given sips of very hot water and occasionally small doses of opium. On one occasion he was delirious, and believing that it might be due to the starvation I allowed him a little more milk, some thin arrowroot, and tea at intervals. The delirium at once ceased.

The points in the case to which I may again refer are: The upper rent in the bowel was apparently about the junction of the duodenum and the jejunum, allowing the upper cut end to be easily manipulated outside the abdomen. The intestines were empty at the time of the accident, the boy having had no food since one o'clock that day. He had a previous training as a patient for three months with a broken patella and was easily managed.

I was assisted throughout by the help and advice of my senior colleague, Mr. Ormsby, and I owe my sincere thanks to Mr. T. J. Moriarty, my surgical dresser, for his care and attention in the after-treatment of the case.

Mr. T. Myles said he quite agreed with Mr. Joynt in the inadvisableness of using a Murphy's button in the operation on the large bowel, especially as one had been used to connect the surgical wound surfaces in the small bowel. The Murphy's button, being liberated earlier in the small intestine, would very probably occlude the Murphy's button in the colon. Suturing the bowel has the great advantage of being free from the risk of occlusion; the surgeon is not kept for seventeen or eighteen days in a state of anxiety waiting for the passing of the button, and with a little practice the bowel can be sutured almost as quickly as the button could be fixed in position. He was much impressed with the fact that the boy was kept for some days without food. Abdominal surgery has taught them that food may be safely withheld from patients for some days. In this case delirium

supervened, but was quickly subdued by the giving of some nourishment.

Mr. L. H. Ormsby said that when he came to assist Mr. Lane Joynt the case looked hopeless. The operation, which took two hours to perform, was watched with care and attention. He agreed that the Murphy button was inadvisable. The lesson he learned from this case was that when a case is seen no time is to be lost. Mr. Lane Joynt's quickness in taking immediate steps saved the boy's life. He (Mr. Ormsby) saw the boy a few days since, and found him looking strong and well. It is impossible to tell by external appearances the serious injury that may have taken place.

Mr. Doyle said he did not agree with those that held an operation was necessary in every case of abdominal injury. He related a case of a boy who by a fall from a height on a sharp stone sustained severe abdominal injuries and got diffuse peritonitis, but he is to-day alive and well, although his parents refused to allow an operation.

Mr. Blayney said he would like to hear from Mr. Joynt what he thought of Cheatle's suture, and what reason he had for employing it in this case? He (Mr. Blayney) looked on it as trustworthy.

Mr. Lentaigne said he would like to know how Mr. Joynt dealt with the hæmorrhage. In his experience it formed one of the most troublesome incidents of such operations. He considered the Murphy button altogether unsuitable in section of the large intestine. He was anxious to hear Mr. Joynt's explanation of the not uncommon fact that severe injury to the intestines would result from external violence without being accompanied by any external injury.

Dr. Parsons said he was much interested in the account Mr. Lane Joynt gave of the gradual increase in the frequency of the pulse, which he (Dr. Parsons) looked on as a valuable sign in perforation of the stomach. Ten years ago he read a paper on this steady increase in the number of the pulsations, which averaged ten in the hour. He would like to hear from Mr. Lane Joynt why he operated on this boy? The boy's appearance was good, his pulse was normal, there seemed to be no indication of danger. He would have been inclined to have everything in

readiness for operation, but he would have waited for symptoms of injury.

MR. LANE JOYNT said, in reply, that Mr. T. Myles had pointed out one of the great difficulties—want of practice in suturing the bowels. The difficulty, however, was to get bowels to suture; the intestines in the cadaver were so wholly unlike those in the living subject that they were of no use for the purpose. He purposed trying the suturing on the carcases of pigs. With Mr. Doyle he agreed that occasionally a marvellous case of abdominal injury does occur and recover without surgical interference; but he looked on such cases as showing how much some natures may suffer and yet the patient survive. He does not, and cannot, consider them as in any way justifying non-interference. The Cheatle suture he found easy to use, and capable of being rapidly executed. It has the great advantage that in its application the bowel is not mauled. He was fortunate in having no hæmorrhage to contend with. The consensus of surgical opinion is against the use of Murphy's button in excision of portions of the large intestine. Homer Gage, of Worcester, Massachusetts, had published a number of cases of similar injury to the intestines. A number of these had been caused by pieces of wood thrown from circular saws in saw mills, and some by carriage poles and similar blunt pointed objects striking people in the abdomen. Where operation was performed, injury to the mesentery or intestines had always been found. If the rate of revolution of an average sized circular saw be considered, it will be found that the peripheral speed of the saw, and consequently the speed of fragments of wood flying off at a tangent, approximates very closely to that speed of impact caused by a bicyclist riding eight to ten miles an hour colliding with a vehicle going towards the bicycle at a similar or less speed, the speed of impact being the sum of the speed of the two moving bodies. Experience showed that such blows were invariably accompanied by internal injuries, and the history of the case alone was sufficient grounds to justify operation.

TWO CASES OF GASTRIC ULCER.

By ALEXANDER BLAYNEY, F.R.C.S.;
Assistant Surgeon to the Mater Misericordiæ Hospital.

[Read in the Section of Surgery, May 9, 1902.]

Were the case I am about to relate one in which the operation was a complete success, the patient never showing a subsequent bad symptom, I do not think I should be justified in bringing it forward. It seems to me, however, that its interest is just in proportion to its remoteness from the above gratifying result, about which we now so often read. Were we enabled to get the details of the unsuccessful cases, and the causes of the non-success as verified by subsequent *post-mortem* examination, we should, I feel confident, gain a much more accurate idea of the difficulties which have to be met with, and the best means of surmounting them, than we do from reading the records of the eminently successful cases, which are almost the only ones now published. While this paper mainly deals with a case in which the patient's life was ultimately saved, I shall preface it with the brief history of one in which the contrary result unfortunately took place, but in which the knowledge gained from watching its progress enabled me to save the life of my second patient.

The first patient was a girl, aged twenty-four, who had suffered from anæmia and symptoms of gastric ulcer for more than a year. While not performing any laborious work she got a sudden pain in the abdomen and felt very faint. She was removed to bed, where she vomited, and the pain became gradually worse. I did not see her till about twenty-one hours after the onset of the attack, when I found her with rigid, tender abdomen, a rapid pulse, and an expression of considerable anxiety. She had had vomiting two or three times since the first appearance of sym-

ptoms, and neither fæces nor flatus had passed. She was immediately submitted to operation, and a rather small aperture was found near the pylorus. It was readily stitched up, there being but little induration in the neighbourhood of the ulcer.

The abdomen was well flushed out and closed without drainage. The patient rallied well from the operation; her temperature, at first somewhat elevated, began to fall; her pulse-rate declined also, and everything seemed to be progressing most favourably up to about the sixth day. Her temperature then began to show an upward tendency, and some pain was experienced. The temperature was higher next day and the pulse-rate faster. A careful examination was made of her abdomen, more especially in view of her having a sub-diaphragmatic abscess, which I knew to be a not infrequent sequel of gastric perforation. The area of liver dulness was normal, and all that could be made out was some tenderness in the neighbourhood of the wound, which itself had healed by first intention.

I did not then deem the symptoms sufficiently alarming to justify a reopening of the abdomen. For the next two days there was no change; her temperature remained about 102°, pulse 120. The next night, about one, she got a violent pain in the abdomen, became collapsed, and died eleven days after operation, about seven in the morning, without my being summoned to see her. I made a *post-mortem* examination and found that she had suffered from a small sub-diaphragmatic abscess, which had burst into the general peritoneum. The rupture in the stomach was perfectly healed externally. I was not allowed to remove the stomach, and so did not see its internal aspect.

On reflecting on this case I felt that she might easily have been saved by reopening of the wound while the abscess was still localised, and I resolved, if in any subsequent case a similar train of symptoms should make their appearance, to at once explore the abdomen, whether I could find localising symptoms of abscess or not.

L. S., unmarried, aged twenty-one, housemaid, was admitted on January 28th, 1902, suffering from intense pain in abdomen, with vomiting.

As a child had been quite healthy. Since puberty, however, has been delicate, suffering apparently from anæmia, as she states she was always pale, got easily breathless, and suffered from palpitations. She did not menstruate till she was 17, and since then has been always irregular, the menses appearing only at intervals of two to three months.

She began to suffer from pain in the stomach about two years ago, and during these two years she has been suffering from it, except for a few months, when she was under treatment and returned home to the country. The pain came on about ten minutes after taking food; it was relieved to some extent by lying on her back with an inclination towards the right side. It was also relieved by vomiting, which usually followed within about an hour of taking food. The vomited matter was sometimes dark brown in colour, but never contained unaltered blood.

The treatment which she received was apparently the administration of iron in the form of Blaud's pills. This with a change to the country improved her condition, and the pain disappeared for some time. She stopped taking the pills about a month previous to her admission to the hospital. On the day previous to this she took a dinner, consisting principally of beef and bread, about twelve o'clock. She had some tea and bread and butter about five, and a similar meal at nine. She had had no vomiting that day. About half an hour after going to bed, and about eleven o'clock, she was seized with a violent pain in her stomach and left shoulder. The pain was constant in character, with exacerbation at intervals of about three or four minutes. She vomited immediately after getting the pain about half a pint of brownish matter. She felt very cold, and was given brandy on two occasions, but it was promptly vomited each time. She was seen soon after her attack by a doctor, who gave her two pills, which she retained. The pain remained all night. She was sent into the Mater Hospital about eleven o'clock next day, but I did not see her till about half-past five.

At that time her face presented a drawn appearance as of one in considerable pain. On examination of her abdomen it was found to be moderately distended, rigid, very tender on pressure in the epigastric region; tympanitic, the resonant area extending upwards for a considerable distance, and almost causing total disappearance of the liver dulness. The pulse was about 128, and

very feeble. Temperature 100°. No fæces had been passed since attack, but about 6 ozs. of urine were passed while in hospital. A diagnosis of perforated gastric ulcer was made, and she was at once submitted to operation.

A hypodermic injection containing $\frac{1}{30}$th gr. strychnine having been given, the patient was anæsthetised with ether, and a median incision about 5 ins. long was made between the ensiform cartilage and the umbilicus. There was a very thick layer of extra-peritoneal fat, resembling omentum in its appearance, and at first giving me the impression that the peritoneum had been opened, when, as a matter of fact, it had not yet been reached. However, the identification of the structure was soon established and the peritoneum opened. A considerable quantity of greenish-coloured fluid came away, but there was no gas free in the peritoneal cavity. Large flakes of lymph were to be seen here and there on the intestines and stomach. There was some little difficulty in locating and reaching the site of perforation; when finally exposed it was found to be situated on the anterior wall near the cardiac orifice, and close to the lesser curvature. It was about the size of a sixpence, and a considerable area of the stomach, for about three-quarters of an inch all round, was found to be markedly indurated. The peritoneal aspect of the stomach in the neighbourhood was much reddened. The first Lembert sutures inserted, even at a considerable distance from the aperture, cut through. The next sutures were consequently put in even farther out; about half a dozen were put in before any attempt was made to tie them, so as to distribute the tension. The two folds of stomach were then held up by Mr. Hayes, who was assisting; while they were thus held in approximation the sutures were tied. A few more were then inserted, and finally a piece of the lesser omentum was turned down and stitched over the line of sutures. The upper portion of the abdomen was then flushed out with large quantities of sterile saline solution repeated till it returned quite clear, a gauze drain inserted down to the line of sutures, and the wound closed with through-and-through sutures of silkworm-gut. The operation in all lasted a little over an hour.

The patient bore the operation fairly well. The early treatment consisted of the administration of nutrient enemata containing beaten up egg and brandy every fourth hour, liq. strych. 5 ♏. every sixth hour. Nothing was given by the mouth for five days,

when some raisin tea was given, which was very agreeable to her. The gauze drain was removed next day, but owing to some doubt as to the security of the sutures it was replaced by some more gauze.

She continued steadily to improve, her temperature and pulse-rate falling. Her bowels responded to an enema given on the second day after the operation, and moved spontaneously on the two following days. On the seventh day her morning temperature was 97°, her evening temperature 98·2°, pulse 64 and 80 respectively. From this on, however, both temperature and pulse-rate showed a tendency to rise, and on changing the gauze plug on the *tenth day* a slightly foul odour was perceptible. She was now complaining of some pain and tenderness, referred chiefly to the left of the wound. The temperature was 100·8° on the same night, and guided by my experience in the previous case I determined to reopen the abdomen, which was done on the eleventh day after the operation. I first explored the sub-diaphragmatic space on the right side, but found nothing. I then directed my finger towards the site of the original perforation, and after pushing it for some distance up I broke down an adhesion which allowed free some very foul-smelling pus. I could not for some time localise the aperture whence it came; it gushed out synchronously with the respiratory movements from some spot deep under the left dome of the diaphragm. In order to give myself room I then at once cut across the left rectus muscle, and was now able to get my finger into the aperture, and on pushing it on it entered a large space filled with pus in the neighbourhood of the spleen. Considering the situation of the abscess cavity I did not think the anterior aperture would drain it thoroughly, and I accordingly cut down on the ninth intercostal space, which I made prominent by thrusting my left finger through the abscess cavity. The incision was so low down as to be below the pleural reflection, so that the danger of an empyema was avoided. A large drainage tube was inserted here. The anterior wound was closed except the upper angle of the longitudinal wound and the outer angle of the transverse wound, which were plugged with gauze. A copious dressing was then applied and the patient sent back to bed.

The effect of the operation was to cause an immediate drop in the temperature to 98·6° on the same evening. However, it rose again, and for the next ten days it remained up, reaching as high

as 102° on the twentieth day after the original operation. At this time, too, the patient got an attack of diarrhœa and vomiting and complained of pain, this time on the right side of the wound. As the pain continued, I again explored the sub-diaphragmatic space, first with an exploring needle and subsequently with my finger (no anæsthetic), but with negative result. However, from this on the progress of the case was steadily towards recovery. The temperature fell to normal; in about five days more the pulse-rate came down, the discharge from the posterior drainage tube gradually diminished, and the anterior apertures in which the gauze had been placed filled up with granulated tissue and healed in.

I was enabled to show the patient at the last meeting of the Surgical Section, on April 4th. At that time the anterior wound was quite closed and the posterior almost. Complications were not yet done with, however, for on the following Friday, a week after she was shown, her temperature was up again. Next day on examining the anterior wound I found it inflamed, and a fluctuating swelling could be made out underneath. On incising this, about two ounces of foul-smelling pus were evacuated. The opening at once brought relief. Her temperature fell, the odour and discharge gradually diminished, and, with the exception of a very small sinus, she is quite well.

As regards her food during the course of her treatment, raisin tea was the first thing given by the mouth, about the end of the first week. This was continued alone for about three days. She then got milk and lime water, beef juice, then in a few days milk puddings, a beaten-up egg, and about the end of four weeks a little bread. About a fortnight later she got some chicken, and when leaving hospital was on the ordinary diet. The stomach symptoms from which she suffered two years previously have completely disappeared, and she has now absolutely no pain after a meal.

Such in brief is the history of the case which I have thought worthy of presenting to your notice; it had many points of interest for me, of which I should like to select for special mention two. The first concerns the formation of the peri-splenic abscess and the symptoms associated therewith. There seems to me to be two possible explanations of its origin—

the first and more probable, that the primary flushing out of the abdomen was imperfect, and some bacteria containing extravasation having been left behind, an acute, but localised, inflammation was set up, terminating in abscess formation; the other, that a subsequent giving way of the suture line allowed of a secondary perforation terminating in localised abscess formation. As against the latter theory there was absent the history of any sudden onset, and, furthermore, there was never any evidence of stomach contents in the discharge from the cavity. Taking, then, the first theory as the more probable one, what strikes me most forcibly is the steady fall of temperature and pulse-rate, notwithstanding the formation of an intraperitoneal abscess, which at the time of opening contained more than a pint of fœtid pus. The explanation of this I must leave to other and wiser heads. The moral is obvious—never be betrayed into giving a positively favourable prognosis after such an operation because of a steady fall of temperature and pulse-rate in the first six or seven days.

The second point I should like to dwell on is that in both the extravasation was limited to the upper portion of the abdomen. This I attribute to the condition of the transverse colon, which in both cases I found distended and pushed upwards, overlapping to a considerable extent the stomach, and giving the explanation of the resonant note which was to be made out over the lower part of the hepatic area. In neither case was there any free gas inside the abdominal cavity, the presence of which used formerly to be postulated in every case in which there was disappearance of the area of hepatic dulness.

Mr. Ormsby said he was sure they were all pleased at the good results that attended Mr. Blayney's efforts, which were successful from the knowledge gained by his former mistake.

MR. R. LANE JOYNT said Mr. Blayney's paper was interesting from the long after-treatment necessary, and the way he coped with the many complications. He had prescribed raisin tea for his boy patient, but the lad disliked its sweet taste, and as it purged him it was discontinued. He would like to know how Mr. Blayney got clear of the risk of wounding the pleura. It is easy on the cadaver to recognise everything, but in the freedom given by a small surgical wound in the living body things are not so easy, all the difficulties are not anatomical ones.

MR. LENTAIGNE said the case shows the extreme importance of ascertaining in every case of non-success what it was that caused the non-success. Mr. A. Blayney saved his second case by formulating a plan from the knowledge he acquired from the unsuccessful one. He quite agreed that some of the poison left after the washing out of the peritoneum caused the abscess.

MR. TAYLOR said he might just point out that the pleura can be avoided by taking the lower border of the ninth rib in the mid-axillary line. The pleura does not come within three finger-widths of this depth.

DR. PARSONS said two years ago he had a somewhat similar case to that of Mr. Blayney. The area of the perforation was so infiltrated that the sutures cut through, and the wound in the stomach was sealed with a piece of omentum, and a gauze drainage piece was inserted. Ten days afterwards the temperature suddenly rose to 101°; the wound was opened, and an abscess was found. The patient subsequently recovered, but is still from time to time subject to severe attacks of pain. He would like to know the subsequent history of Mr. Blayney's case. He cannot understand why Mr. Blayney deferred operation so long. The perforation took place at 11 30 p.m. after a large meal of bread and beef, and yet the operation was not performed until 5 p.m. on the following day. Hilton Fagge had laid down twelve hours as the limit in time for success; in this case twenty-one hours elapsed. One of the most important factors in determining the issue is time.

MR. BLAYNEY said, in reply, that raisin tea was liked by his patient and did not produce purging; it is advisable to avoid the use of proteids in such cases. The transverse incision allowed of his pressing outward the skin with his finger at the lower border of the ninth rib, where he felt pretty certain he was free of the

pleura. He quite agrees that time is of the utmost importance in such cases. Withal he cannot accept Hilton Fagge's limit, for cases have recovered after thirty hours. All the same the operation, if possible, is best performed within the twelve hours, within which limit 50 per cent. of cases recover.

SECTION OF OBSTETRICS.

NOTES ON A CASE OF SUPPURATING OVARIAN CYST, COMPLICATED WITH A LARGE INTRA-PERITONEAL ABSCESS.

By HENRY JELLETT, M.D., F.R.C.P.;
Ex-Assistant Master, Rotunda Hospital.

[Read in the Section of Obstetrics, November 22, 1901.]

The following case is, I think, worthy of being brought to the notice of the Academy. It furnishes an example of a happily not very common complication of an ovarian cyst, and is for this and perhaps for other reasons of interest. Before proceeding to relate it, I must mention that I am not alone responsible for the good results with which its treatment was attended, but that it was a case the major credit for which belongs to our late President, Dr. A. V. Macan, who was the first person to operate upon the patient.

Case.—Mrs. K. D., aged thirty-eight, was admitted to Sir P. Dun's Hospital, under the care of Dr. Macan, on July 27th last. The patient, at the time of admission, was in an extremely critical condition. She suffered from great pain over the abdomen, loss of appetite, thirst, vomiting, extreme constipation, and debility. These symptoms had been present to a marked degree for the previous five weeks, but prior to that time she stated that her health had been fairly good. Her temperature on admission was 101° F., and her pulse varied from 100 to 120. On examination, her abdomen was found to be distended, owing to the presence in the lower part of a large and tense tumour, in the upper part of distended intestines. By vaginal examination, a tumour could also be found filling Douglas' pouch. The patient was kept under

observation for a few days, and attempts made to secure an evacuation of the bowels. As, however, there was no improvement, but rather a deterioration in her condition, Dr. Macan determined to open the abdomen. On July 31st he accordingly operated upon the patient—a proceeding at which he kindly invited me to assist. On opening the peritoneal cavity, it was found that the tumour was formed by a very large and very fœtid collection of pus among the intestines. The collection extended upwards to slightly above the umbilicus, and downwards to the bladder, and the upper portion of Douglas' pouch. There were, as is usual, several loculi in which further and equally fœtid collections of pus were found. With considerable difficulty all the contents of the abscess were evacuated, and the cavity was washed out and plugged from above with iodoform gauze. The abdominal wound was then closed save for a portion of the lower end, through which the gauze emerged. I may mention that towards the end of the operation the advisability of draining from the vagina was discussed, and with a view to making the necessary opening, Dr. Macan asked me to pass my fingers into the vagina in order to determine the direction in which an incision should be made. However, when I had done this, we found that the collection of pus had not extended to the bottom of Douglas's pouch, inasmuch as the latter was occupied by a swelling the size of an orange, anteposed to which was the uterus. The condition of the patient at this time was so bad that it was determined not to remove this mass, but to trust to drainage from above. This decision I consider to have been very wise, as the further manipulations which its removal would have entailed would quite possibly have been sufficient to turn the scale against the patient.

The condition of the patient after the operation was very critical. She suffered much from vomiting, her pulse was weak, and her temperature sub-normal. She, however, was able to take small amounts of liquid nourishment, and on the second day after the operation her bowels acted. On August 3rd, Dr. Macan went for his holidays, and the patient came under my care. She was then, to my mind, in an extremely bad condition, as a consequence of toxic absorption from the abscess. Her pulse was very feeble, and her temperature varied from subnormal to 101° F. Her skin was jaundiced, her eyes sunk in her head, and her mind wandering. Further, it was difficult to induce her to take nourishment. The wound had been dressed twice daily since the operation,

and the cavity douched out and plugged lightly with iodoform gauze. In spite of this, the smell of the discharge was still most offensive. As the solution with which the cavity was douched did not seem to produce any good effects—I believe that lysol had been used—I desired the nurse to inject instead a 25 per cent. solution of "sanitas" in warm water, and to wash out the cavity still more frequently than she had been doing. I had, however, very little hope of effecting a good result. The next day the patient was slightly better. The day after her condition was again improved, and the discharge was losing its extreme fœtor. This gradual improvement continued, until, by August 8th, the temperature had fallen to almost normal. At the same time, the abscess cavity was becoming notably smaller, and in a few days more it was possible to dispense with all plugging.

I may mention, incidentally, that in consequence of the infection of the abdominal wound by the contents of the abscess, all the sutures had cut out, and the entire wound, save for what was apparently a peritoneal floor, had reopened. As a result of the distended condition of the intestines, to which I will presently refer, this gaping became very marked, and must have measured as much as two inches across. Accordingly, as the condition of the patient was daily improving, I determined to bring together the edges with sutures. This I tried to do on August 19th, the sutures being passed subsequent to endermal injections of cocaine. In consequence, however, of the extreme thinness of the walls, and of the flaccidity of the skin, it was impossible to obtain a firm suture-hold of anything save the skin, and even then the sutures appeared merely to produce an inversion of the latter. However, the results of the re-suturing were not so bad as they appeared; the wound was immediately diminished by about half its width, and this was subsequently again further diminished by straps of adhesive plaster pulling over little rolls of cotton wool placed in the wound to keep the skin from inversion.

Unfortunately, the great improvement which had taken place in the patient's condition proved to be only temporary, and about September 1st she showed signs of returning to her former state. Her temperature again rose, reaching a height in the evening of 101° F., her appetite was lost, the abdomen became very tympanitic, and it was almost impossible to get the bowels to move. I then examined the abdominal wound very carefully, but could

find no sign of any accumulation of pus in its neighbourhood. The small sinus, which a few days previously had led to the former site of the abscess cavity, was almost completely closed. It appeared to be in every way healthy, and there was no evidence of any accumulation of pus around or below it. Accordingly, I made a vaginal and rectal examination, and was then easily able to determine the presence of a swelling completely filling Douglas' pouch, pressing upon the rectum, and obviously containing fluid. It was apparently larger than at the time of the operation.

As this swelling was obviously the cause of the patient's condition, I determined to remove it with as little delay as possible. Accordingly, on September 5th, five weeks after the first operation, with the assistance of Dr. Kennan, I opened the posterior vaginal fornix in the usual manner. On reaching Douglas' pouch I found that my finger came into contact with a well-defined tumour, adherent to the neighbouring structures, and containing fluid. The adhesions to the floor of Douglas' pouch could be easily broken down, but at the upper portion of the tumour they were very dense. Whilst breaking these down, a portion of the wall of the tumour was torn, and a quantity of very fœtid pus escaped. With some little difficulty the tumour was separated from its upper attachments, and remained alone attached by what was apparently a pedicle connecting it with the right cornu of the uterus. There was no trace of any structure resembling the pelvic-infundibulo ligament. As there was a considerable amount of hæmorrhage from the broken down adhesions, and possibly from the remains of this ligament, I applied a clamp to the pedicle, divided the latter, and removed the tumour. Then, as there was no bleeding point to be seen, but a quantity of general oozing, I plugged the pelvis with gauze sponges wrung out of water at a temperature of about 115° F., taking care not to disturb the clamp. The following day I removed the sponges, a process which necessitated the administration of nitrous oxide gas. I had not intended to remove the clamp until the following day, but it came off in the process of re-plugging the pelvis, the reason for which was subsequently made very obvious. There was, however, no hæmorrhage. I re-plugged the pelvis each day through a glass speculum, inserted through the opening in the vaginal fornix. For the first few days it was necessary to administer an anæsthetic, as the patient could not bear the pain which the proceeding caused.

Each day the cavity became a little smaller, the patient's temperature gradually fell to, and then remained at, normal, and her condition materially improved. About the middle of September Dr. Macan returned, and I resigned her to his care. She continued to improve steadily from day to day, and on November 10th she left the hospital.

The history of the clamp, which fell off, is not uninteresting. It was given to the nurse to wash, and as soon as it was placed in warm water one blade fell off. It had apparently cracked half across at the lock during the application, and then completely across whilst it was *in situ*. The dried blood with which it was covered had, however, proved sufficient to hold it together. The clamp had been made in Germany. The moral is obvious.

There is one point which this case shows very clearly, and that is the amount of fœtid pus which can be present in a patient without interfering with the temperature, when once she has become, so to speak, inoculated against such pus. In this case, after the patient had recovered from the first operation, her temperature fell to normal, and remained so for seventeen days. Yet all the while there was an accumulation of most fœtid pus in the pelvis.

The action of sponges wrung out of very hot water in checking what was a considerable amount of hæmorrhage, was most satisfactory. Their temporary use had been suggested to me by Dr. Glenn in a previous case, where they had also succeeded admirably. In this case they were allowed to remain as a substitute for iodoform gauze, and were removed without difficulty on the following day.

The cause of the large abscess which Dr. Macan opened seemed to be very obscure at the time of his operation. There was a collection of pus among the intestines, apparently unconnected with any tangible source of infection. The subsequent discovery of the suppurating ovarian cyst will,

however, I think, explain its origin. To my mind, the case was originally one of an ovarian cyst, the pedicle of which became twisted. The contents of the cyst were then infected from the rectum, and this infection extended in turn through the walls of the cyst into the peritoneal cavity, setting up a localised peritonitis, and ultimately leading to the formation of a large abscess.

Dr. Macan remarked that the woman, whose history they had just heard, was the worst case he ever had in hospital. He determined on laparotomy on her admission, as if anything could be done it should be done quickly. The cause of her condition was found to be a fœtid abscess. The fact that the temperature remained normal for seventeen days after it had become normal he considered to be noteworthy; it showed how there may be pus without a rise of temperature. He afterwards thought that he should have drained the abdomen through the vagina, but he found a firm mass in Douglas' pouch, and the patient was not young enough or well enough for a voyage of discovery. The forceps that broke was "made in Germany," but if you take too weak a forceps, say an intestinal one, to clamp an ovarian tube, you can break it, even if made in England.

Dr. Alfred Smith said one could not estimate the character of the pus from its stench—pus collections in the neighbourhood of the rectum are notoriously ill-smelling. The relief of pain felt after opening an abscess, he thought, is due to the diminution of tension of the abscess sac. Emptying the first abscess relieved tension, pain ceased, and temperature fell. Then the second abscess ripened, became tense, and temperature rose. His favourite antiseptic wash was peroxide of hydrogen, with which he washes the sac until the fluid comes back free from air bubbles.

Dr. Purefoy, Master of the Rotunda Hospital, was of opinion that Dr. Jellett's paper offered several practical points for consideration—there was oozing of blood, which, in such cases, was not without danger. And he could not but think that both the operators, Dr. Jellett and Dr. Macan, lacked courage in not opening into Douglas' pouch from the vagina and emptying the pocket of pus, which afterwards gave so much trouble, necessitating a

second operation. Dr. Jellett's report was not consistent; the mass in Douglas' space is in one place referred to as a hard mass, and again spoken of as a collection of pus.

DR. MACAN rose to give a personal explanation. If a normal temperature is followed by a rise seventeen days after operation it shows that something must have happened.

DR. JELLETT, in reply, said the improvement in the patient after Dr. Macan's operation was only relative. Her temperature fell, her pain ceased for a time, but she could not be got to take food. The mass in Douglas' space had considerably increased between the operations—it was an increase in pus, not a fresh formation. The explanation of Dr. A. Smith that pain in such cases is due to tension of the sac is probably right.

A NOTE ON THE MODERN TECHNIQUE OF POSTERIOR VAGINAL CŒLIOTOMY.

By E. HASTINGS TWEEDY, F.R.C.P.;
Ex-Assistant Master, Rotunda Hospital.

[Read in the Section of Obstetrics, November 22, 1901.]

The specimen I have the honour of presenting to your consideration this evening consists of the right Fallopian tube and a parovarian cyst removed from a very stout patient of mine in Steevens' Hospital, by the operation known as Prior's posterior vaginal cœliotomy. Prior's operation does not appear to have received the attention it deserves either in this country or yet in England, and it is for the purpose of eliciting the views of members here to-night concerning it that I now present this very commonplace specimen. With a few exceptions, Irish surgeons seem to have made incision into the anterior fornix their operation of election when performing colpotomy, and there does not appear any indication that the operation is advancing in popular favour, or even holding its own.

The objections urged against it are, that the limited opening into the abdominal cavity does not permit of the various steps of the operation being seen, consequently irreparable harm may be inflicted on important structures, which neither the sense of touch nor a previous knowledge of anatomy can safeguard.

I believe we possess in Prior's operation a means of overcoming these and other objections to a considerable extent, provided conditions be favourable; or, in other words, provided a woman has borne a full-term child, and the vagina be not inflamed or abnormal.

In the removal of this tumour I followed his procedure, which I shall now describe in detail. The patient, a very stout woman, with a roomy vagina, was prepared as for an ordinary abdominal section, anæsthetised, and then placed on Burndt's operating table, in the usual dorsal position. The shaved vulva and the vagina were now for the second time scrubbed thoroughly with soap and water (green soap is to be preferred), then douched out with creolin solution, and finally bathed in an alcoholic solution of biniodide of mercury (1 in 1000). This latter antiseptic is the one now most relied on in Steevens' Hospital for the final stages of skin disinfection. It has not alone the merit of great penetrability, but likewise hardens and cornifies epithelium, so hindering maceration and its removal during the operation. A bullet forceps was then attached to the posterior cervical lip, and the fornix exposed by means of a Martin's speculum. On moving the cervix up and down, the crescentic fold, which indicates the reflection of the vagina on to the cervix, was clearly made out. This I picked up by a forceps, and incised the vaginal mucous membrane to the extent of about an inch, in the transverse direction, by means of sharp-pointed scissors. This incision did not go deeper than the mucous membrane. A catch forceps was then fixed on the posterior flap, and my assistant was directed to make firm traction on this, as well as on the forceps attached to the cervix. My index fingers were now inserted into the wound, and tore with ease through the peritoneum, close to its uterine reflection. Before withdrawing the fingers the wound was enlarged by lateral tearing. This procedure is easily carried out, and does not involve fear of injury to the ureters, nor to the uterine vessels, provided undue force be not employed. The fingers having been withdrawn, a gauze wipe wrung out in saline solution, and to which a piece of silk is attached for ease in its removal, was now placed in the abdominal cavity to collect blood or other

discharge, and to partially shut off the intestines from dust infection.

The next step of the operation consisted in the passing of two long vaginal retractors into the wound, and the removal of all other instruments from the vagina. The table was now lowered, so that the patient, with her knees still in the gynæcological crutches, assumed the "head downward" or Trendelenburg position. On now widely separating the retractors the intestines could clearly be observed as they slowly receded from the field of operation, and an excellent view of the cyst—in size about that of a billiard ball—was obtained. The anterior blade was now removed, and the tumour, seized by a couple of fingers, presented no difficulties in its removal. The patient, raised again to the horizontal position, had the temporary pad removed, a strip of moist iodoform gauze was inserted just within the lips of the wound, and the vagina well packed around the fornices with similar material. This packing was taken out on the third day, the patient being under the influence of chloroform, and lying in the Sims' position. A new one was inserted, but not through the wound, this being a departure from the original operation, which provides for a drainage for seven days—an unnecessary precaution to my mind.

Dilatation of the sphincter and the passage of a catheter every four hours are further suggestions the soundness of which will not be called in question.

The operation as thus described is a simple and rapid procedure, and remarkably free from complications. It is obvious that it possesses a wide range of usefulness, but as the indications for its employment are now sufficiently well known I need not dwell on them. As a means of gaining access to, and a greater knowledge of, the structures on which we intend to operate, I believe it to be far superior to the older operations. With it injuries to the rectum should be avoided, while ad-

hesions can be attacked, and separated with as much ease, and with far less danger, than if dealt with by means of a suprapubic incision. Moreover, should the bowel give way while endeavouring to combat adhesions, the accident is not likely to prove of a very formidable character. The general peritoneal cavity is almost certainly shut off from infection, and the rupture, even though unclosed at the time of operation, will heal spontaneously in the majority of instances. I hold that all recent cases of pyosalpinx, which call for operative interference, should, when possible, be approached through the vagina. Multiple incisions into the abscess cavities, with subsequent drainage—the whole procedure, guided by sight and touch, even though it fail to effect a permanent cure—will at least render any more radical operation afterwards undertaken comparatively safe.

I trust I shall not be understood as saying that the operation just described marks any radical departure in vaginal cœliotomy. I am aware that posterior colpotomy has been performed very frequently by different surgeons in this city who can testify to the easy manner in which tubes and ovaries, even though normally situate, can be palpated and directly examined by its means. My contention merely is that Prior's operation makes a step forward in its technique, and somewhat enlarges its scope. Furthermore, it is obvious that anterior colpotomy must of necessity remain the proper operation under certain conditions. Finally, I should like to point out the great advantage afforded by modern operating tables, giving as they do a good Trendelenburg position, without which Prior's operation becomes impossible of execution. And of scarcely less importance is a sufficiency of light, hardly procurable in any but the recently built operating theatre, of which we possess a very good example in Steevens' Hospital.

Dr. Macan remarked that he was old enough to confess he did not know what Prior's operation is, and was not much enlightened by the paper. Operators had long used both anterior and posterior colpotomy, and Prior did nothing, in his opinion, except the posterior operation with the use of the Trendelenburg position. He did not think the position in such an operation brings the parts well into view—better without it; nor could he understand how the ureters or vessels could come into the way of the operator in posterior colpotomy. He looked upon the removal of plugs as almost always painful unless you wait for the presence of some moisture—a course to be recommended—always supposing there is no rise of temperature. In all such cases the question naturally arises—What route will the surgeon pursue: vaginal or abdominal? In unilateral diseases he preferred the superior operation, as one gets a better view of the condition of the parts. In cases of abscess the vaginal route is, as a rule, preferable, and when tumour is located in Douglas's pouch posterior colpotomy is to be preferred.

Dr. Purefoy did not think that posterior colpotomy is so free from all risks as the paper might lead hearers to think. In two recent cases he had had secondary bleeding. One case occasioned him some anxiety, as the bleeding came on during the night, and he found on his arrival a vessel spouting at the angle of the wounds on which he had to apply a catch forceps.

Dr. Alfred Smith was of opinion that with the use of antiseptics opening the peritoneum has been robbed of its terrors, and he uses the abdominal route in all cases, as giving the best view of the parts, and because it is no more liable to shock than the vaginal. The painful process of removing plugging might be avoided if a bag were used, and this bag filled with tampons of small plugs, which could be readily removed without causing pain. He had found the early removal of plugs comparatively painless, and had no bad results from doing so.

Dr. Jellett said the Section had wandered from the subject of Dr. Tweedy's paper, which was a description of Prior's operation to be used in suitable cases. It is obvious, he remarked, that if adhesions were present no tissues fall down, and there is no increased area of view. Prior's operation was useful in cases of purulent bulging.

Dr. William Smyly could not understand Dr. Jellett's objection. How can we discuss the operation other than by comparing it

with the methods of other operators? An operation very similar to this of Prior's is recommended in cases of hysterectomy for cancer. The Trendelenburg position had the great advantage of allowing of plugging the wound. It may be necessary to allow plugs to remain in a long time. As a whole, he prefers the abdominal route, yet he confessed there are occasions when the vagina is preferable. Our views are modified by time. We are not now so anxious to excise everything. The tendency is to look at patients years after operation, and on their then condition to decide on the benefits or otherwise of the procedure. Years ago he removed a unilateral pyosalpinx, and did it by the abdominal route; he was now able to record that the patient, who went to the country, has been for years quite well, and the mother of a healthy child. In one case he removed the ovaries by the vaginal route, leaving a little of the tubes. Years afterwards the patient had to be again operated on; the remaining portions of the tubes were removed, and the patient is now quite well. Had he selected the abdominal route the second operation would not have been necessary.

Dr. Tweedy, in reply, said that he had brought Prior's operation under notice because it was little known, and, in certain conditions, would be found useful.

NOTES OF A CASE OF CÆSAREAN SECTION.

By ANDREW J. HORNE, F.R.C.P.I.;
Examiner in Midwifery, Royal College of Physicians of Ireland;
Master of the National Lying-in Hospital, Dublin.

[Read in the Section of Obstetrics, December 20, 1901.]

Of the many absorbing topics of medical literature, of the many changes in the art of surgical treatment made in the two last decades, and of the many glorious achievements attained in this period under aseptic and antiseptic methods, to the obstetrician the surgery of the uterus, when complicated with a living fœtus at or near the full term of pregnancy, is the most interesting and important subject he may be called upon for his opinion. In drawing your attention to the subject of Cæsarean section this evening it is not my desire that any very special inference is to be drawn from the case I report, but my desire is simply to put it on record among the Transactions of the Obstetrical Section of the Royal Academy of Medicine in Ireland; secondly, my desire is that it may bring forth a discussion from the members present; and last, my desire is to thank Dr. Elizabeth Massey for the notes; also for her promptitude in bringing the patient into hospital I chiefly attribute the success.

Case—Mrs. T., aged twenty-three. Second pregnancy. Was admitted into the National Maternity Hospital, at 11 30 a.m., on Sunday, July 21st, 1901. She was born in the North, and was considered a weakly child in her first years. She was reared in a chair, as she had not the use of her legs, until she was five years old. First labour, October, 1898, took place in the Rotunda Hospital. Patient was in labour some ten hours, when, after a prolonged instrumental delivery, a dead fœtus was extracted. Her last menstruation was on October 22nd, 1900. At 6 a.m. on Sunday,

July 21st, the membranes ruptured. At 10 a.m. she was visited by Dr. Elizabeth Massey, and she diagnosed a highly contracted pelvis, and had the patient at once removed to hospital. I saw her at noon.

Examination.—The patient was small, delicately built. Height, 4 ft. 4 ins. Measurement from crest of ilium to sole of foot, 29 inches.

From symphysis pubis to umbilicus	6¾ inches.
From ensiform cartilage to umbilicus ..	9 inches.
From left ant. spine to umbilicus	9 inches.
From right ant. spine to umbilicus	9 inches.
From ant. sup. spine to other in front ..	12¼ inches.
Around pelvis at head ant. spine	32½ inches.
From symphysis pubis 2 + 1 to middle of spine	13 inches.

Internal.—From promontory of sacrum to lower angle of symphysis pubis, 2¾ inches.

The cervix was dilated to about the size of a florin; the head of the child could be felt above the brim. On external palpation it was movable. Back of fœtus to the left. The heart sounds were audible immediately below the level of umbilicus, and to the left, about 140 beats to the minute. I at once telephoned to the Rotunda, and have to thank Dr. Lloyd for having supplied me with the particulars of her previous delivery, and as the measurement of the pelvis corresponded with my own, I decided on performing Cæsarean section, the mother having previously expressed the desire that her child should be born alive.

Operation.—At 3 30 p.m. patient was placed under chloroform by Dr. Massey, when ether was substituted, assisted by my colleague, Dr. Barry. An abdominal incision was made, extending from three inches above umbilicus to two inches of symphysis pubis. The uterus was delivered through the abdominal wound, which was temporarily united behind it. An incision was made through the uterine wall, commencing high up at the fundus, but avoiding the lower uterine segment. The placenta was in front and was rapidly cut through; bleeding was at once profuse. The child was seized by the buttocks and extracted; the head followed without any difficulty. The infant, a female, at once cried out. The assistant's hand grasped the uterine edges until I applied an elastic ligature. The placenta was detached without difficulty. The uterus contracted well, hot sterilised towels being

applied; the wounded surfaces were brought together by means of six deep sutures and four superficial silk sutures. The abdomen was closed likewise, using silk for the deep sutures and silkworm-gut for the superficial. The operation lasted forty minutes, the patient leaving the table in good condition. Pulse 105.

The child, a healthy girl, weighed 7 lbs. The progress of the case was most satisfactory. Pain was experienced for only some four hours after operation, which was relieved by $\frac{1}{6}$ gr. of morphia hypodermically. Thirty hours after delivery she was given 5 grs. of calomel; during that night she vomited on four occasions what was described as dark, bilious-looking matter. The bowels were moved by an enema of soap and water, to which a teaspoonful of common salt was added. The further convalescence was uneventful. The mother was able to suckle her child. She sat up on the twenty-first day, and left the hospital on the thirtieth day after operation.

The three important questions I had to decide on my first visit to this patient were:—First, should I allow the labour to proceed, with the object of giving nature a chance of so moulding the head that I might eventually deliver by means of forceps or symphyseotomy; secondly, should I perform a Porro's operation; or finally, a Cæsarean operation. I chose the latter for two reasons—namely, the mother was most anxious a living child should be born, and knowing the result of her previous labour, besides the most important condition that there had been no examination previous to her admission to hospital. The important points to my mind of this case, and upon which I would like to have the opinion of this Section of the Academy, are in connection with the uterine incision, whether one should adopt what is known as the classical anterior incision, or longitudinal, or the transverse incision, as recommended by Fritsch. Recent authorities, notably Schroeder, are much in favour of the latter. The advantages he claims: When made on a woman in the Trendelenburg position this incision allows the waters to escape over the thorax of the patient; the peritoneum is

thus exposed to far less risk of infection. Moreover, it is the best way to avoid the placenta, and finally, as the incision is parallel to the vessels of the fundus, it is not followed by more hæmorrhage than the longitudinal one; in fact, among ninety-four cases of the transverse incision, Schroeder has only found fourteen in which any considerable hæmorrhage at the time of the incision is recorded, and in most cases it is stated that the bleeding ceased when the uterus contracted. Again, by the incision of Fritsch a more rapid extraction of the fœtus is accomplished. By it one almost invariably comes upon one end of the child, either the head or the breech, by the longitudinal incision upon the trunk. When the fœtus has been removed it is perfectly easy to inspect the whole of the uterine cavity down to the lower segment. Objection has been made that the transverse incision is likely to be followed by adhesion to the intestine, but in a paper published in the *Centralblatt f. Gyn.*, 1899, by H. Ludwig, of Vienna, in two Cæsarean operations on the same woman the uterus was opened by a transverse incision through the fundus, and the child extracted alive. The result of the first operation was blameless in so far that the adhesion to the uterine cicatrix was only evident through the old silk suture.

I shall not discuss the Cæsarean operation in its relations to other operations, such as symphyseotomy, craniotomy, and the Porro's operation, as the time at my disposal is too limited, even if I had the desire. We cannot, however, shut our eyes to the fact that the Cæsarean operation is gradually being restored to a position not unlike that of ovariotomy, so that we can speak with confidence, as a rule, to a favourable result. No longer shall we be confronted with the words or saying—"Spare the mother, no matter about the child." The dangers attending the Cæsarean operation ought not to be as great—certainly not greater—than an ovariotomy, but students must be more fully instructed in the recognition of degrees of

pelvic obstruction, so that it will not be necessary for the obstetrician to learn through delay, or through failure with forceps, version or craniotomy, that a Cæsarean section is demanded. I shall not touch on eclampsia, placenta prævia, prolapsed cord, &c., on the light of these forming the most recent indications for Cæsarean section. In the performance of Cæsarean section our motto should be: Operate early, delay is fatal.

Dr. Alfred Smith said he had listened with great pleasure to Dr. Horne's case. It left nothing for criticism, but much for praise. He could say nothing more than that he congratulated Dr. Horne on the successful issue of his operation.

Dr. Glenn agreed with Dr. Horne on the risk of sepsis with which vaginal examination is attended. He thinks the bold, good cut going right through the placenta, if it lies in the line of incision, is good surgery. The risk of soiling the peritoneum by the liquor amnii may be avoided by binding round the uterus; bringing out the womb through the abdominal incision adds to the shock. For a living child he recommends the Cæsarean section, but if the child is dead he prefers Porro's operation. Removal of the placenta is sometimes difficult, and it is advisable to swab out the cavity with hot water. Packing the uterus with gauze, and bringing a portion of the tissue through the dilated os uteri into the vagina is recommended.

Dr. W. J. Smyly desired to add his quota of praise to Dr. Horne on the very successful result of the case. Nothing could be better than an afebrile case and an aseptic recovery. Pelvic deformities were not often met with in Ireland compared with other countries. During his seven years term as Master of the Rotunda he had had only four Cæsarean sections and four symphyseotomies, yet from a letter he received from Glasgow he learns that one of the surgeons of the Maternity in that city had nine Cæsarean sections in nine months. In all these cases the question arises—Should the woman be made sterile at the time of the operation? He thinks not. Can you choose your time for operation? If so, by all means select daylight.

Dr. Horne, in reply, stated that he used silk sutures; he passed

six of them deep through the uterine wall, but not through the lining membrane, and the superficial sutures were through the peritoneum covering the uterine incision. He neither packed nor swabbed the uterus, there having been no risk of infection. He looks on the making sterile of the patient as unjustifiable. After operation he thinks the less interference with the uterus the better. Foreign bodies introduced into it are very likely to set up after-pains.

NOTES ON A LAPAROTOMY FOR A RUPTURED OVARIAN CYSTOMA.

By ALFRED SMITH, F.R.C.S.;
Professor of Midwifery in the Catholic University School of Medicine;
Gynæcologist to St. Vincent's Hospital.

[Read in the Section of Obstetrics, February 7, 1902.]

OVARIAN cysts, we know, may spontaneously rupture into the peritoneal cavity or into some neighbouring organ. When they rupture into the peritoneal cavity the effect on the patient of course depends on the character of such a cyst and of its contents. A malignant cyst may rupture and be followed by dissemination of new growth in the abdomen. An innocent ovarian cyst generally produces but trifling symptoms. Each rupture is accompanied by sudden pain, profuse diuresis, lasting, it may be, for a couple of days, carries off the excess of fluid, and the tumour, altered in shape, gradually refills. There may be a true* acute rupture of an innocent ovarian cyst followed by fatal hæmorrhage and peritonitis. Death even may be so rapid that it seems due to septic intoxication from absorption of the fluid. In such cases there is generally a previous twisting of the pedicle followed by thrombosis of vessels, intracystic hæmorrhage and necrosis.

The following case will, I hope, be of interest to members of this Section as showing what grave symptoms and profound shock may follow spontaneous rupture of a common multilocular glandular cystoma:—

CASE.—Dr. Leo Keegan, House Physician to St. Vincent's Hospital, reports that he was called to see a patient on January 19th, about noon. She had been seized with a violent and sudden pain which she referred to the umbilical region. He found her in a collapsed condition; the abdomen was distended, the respiration was

* Doran. Trans. Path. Soc. Vol. XXXI., p. 180.

rapid, pulse 110, temperature 96° F., and she was bathed in a cold sweat. On careful examination he diagnosed an ovarian cyst, and concluded that it was a case of rupture and sent for me. While waiting my arrival he administered restoratives and kept a careful record of pulse and temperature. The patient recovered somewhat from the initial shock, but about 5 30 o'clock her temperature suddenly went up to 103·8° F. and pulse 140; her condition became grave. On my arrival I determined to operate at once, and had the patient conveyed to the gynæcological theatre, St. Vincent's Hospital. I opened the abdomen, assisted by Mr. Paget Butler and Dr. Leo Keegan. I found a large transverse rent in the capsule and the peritoneal cavity filled with gelatinous cyst contents. There were numerous omental adhesions, and their separation was greatly hampered by the gluey fluid with which they were covered. Having separated the adhesions and tied the pedicle, I douched out with hot saline to remove as much of cyst fluid as possible without sponging. It was gratifying to find how the hot saline, temperature 101° F., seemed to liquefy the gelatinous fluid and facilitate its removal.

Condition of Patient after Operation.—A stimulating saline enema was given to the patient after operation. She spent a restless night from constant retching and thirst. In the morning the temperature fell to 100° F., pulse 132. During the day the pulse-rate increased to 140, temperature 100·6°. The abdomen became distended, and the colour of the vomit a dark green. It came up in mouthfuls without effort. Altogether the condition of the patient was very grave. I ordered the stomach to be washed out with a weak boric solution. This gave temporary relief, and patient spent a somewhat better night. On seeing the patient on the morning of the 21st, nurse reported a return of the vomiting and much distension. I again ordered the stomach to be washed out and a large turpentine enema to be given, with good result. The pulse-rate and temperature fell, and the patient's recovery was uninterrupted.

The points of special interest are:—

1. The cause of the spontaneous rupture.
2. The explanation of the toxic symptoms before operation.
3. The treatment of the persistent vomiting after operation.

The Cause of the Spontaneous Rupture.—As a rule with

large cysts their rupture is due either to traumatism, a blow upon the abdomen, a fall, the strain caused by vomiting, or to fatty degeneration caused by thrombosis. In my case the patient was lying in bed when the rupture occurred. She was a young woman, aged twenty-six, she was married one year and seven months, and she gave birth to a full term child eight months ago. She had a normal labour and puerperium. She noticed nothing unusual in her condition until three months after her confinement; she was then disturbed by a lump "falling about" from side to side as she altered her position in the bed. Having consulted her doctor in November last he sent her up to Dublin for treatment. She was returned home, she says, as pregnant. The abdomen increased so much in size that she was sent up to me. I had not seen the patient until after the rupture occurred, but I am informed she was able to walk without distress or inconvenience. I am inclined to believe the rupture was due to tension from within acting on a fatty degenerated patch in the thin wall of the cyst. This accident, according to Pozzi[a] occurs most frequently in the case of gelatinous cysts such as was found in this case.

The Explanation of the Toxic Symptoms before Operation.—The fluid in glandular cysts is generally of fairly high specific gravity—1010 to 1030. It contains much albumin and mucin, and broken-down cellular elements. The albumins are complicated, consisting of para-albumin and meta-albumin, the former being closely allied to mucin, and the latter is designated by Hammarstein[b] as pseudo-mucin and by Pfannensteil[c] as glyco-proteid. Now this pseudo-mucin is very abundant in cysts containing tough, sticky fluid; it is a secretion, not a degeneration, and it does not occur in parovarian cysts. As toxic symptoms do not follow the rupture

[a] Pozzi. Med. Surg. Gynæcology. Vol. II., p. 131.
[b] Hammarstein. Zeits. f. Phys. Chem. 1882.
[c] Pfannensteil. Arch. f. Gyn. Vol. XXXVII., p. 407.

of ordinary parovarian cysts, it might be that the absorption of large quantities of this glyco-proteid would partially explain the toxæmia. Added to this the many broken-down cellular elements of various kinds which form part of the fluid would furnish ferments, the effect of which thrown into the circulation would give rise to toxic symptoms.

The Treatment of Persistent Vomiting.—This case I think illustrates the great advantage of washing out the stomach for the relief of persistent vomiting after operation. I do not now advocate the exhibition of gastric sedatives. Having washed out the stomach if the patient is much distended, a large stimulating turpentine enema is given to re-establish if possible the normal peristaltic action. The specimen presents no point of interest; it is an ordinary multilocular glandular ovarian cystoma.[a]

DR. KIDD asked had any food been taken by the mouth before the operation, and, if so, what was its character?

DR, W. J. SMYLY stated that he found rupture of ovarian cysts to be caused by tapping, particularly if the operation had been repeated. In one case, after laparotomy had been performed, the contents of the cystoma had escaped into the peritoneal cavity, and so much time was occupied by wiping the matter from the coils of intestines that the patient collapsed. He certainly preferred Dr. Smith's process of flushing out the cavity. Massage was also to be credited with causing the rupture of such tumours. He had seen the daily practice of massage diminish an ovarian cystoma to the vanishing point—the tumour had been ruptured and its contents rubbed out of the sac. Even gentle palpation has caused rupture. In the Adelaide Hospital, whilst very carefully palpating a tumour it burst, and at once he performed laparotomy. He found a malignant cystic tumour, which he removed, and the patient recovered from the operation well, but some months after the disease recurred.

In reply, DR. ALFRED SMITH stated that he looks on washing out the peritoneum as the rational method. Vomiting commenced from the moment of consciousness from the etherisation.

[a] Roberts. Outlines Gynæcological Path. P. 207.

NOTES ON A CASE OF INDUCTION OF LABOUR FOLLOWED BY ENUCLEATION OF FIBROID TUMOUR FROM CERVIX.

By FRED. WM. KIDD, M.D.;
Professor of Midwifery, Royal College of Surgeons, Ireland;
Consulting Surgeon and late Master, Coombe Hospital, Dublin.

[Read in the Section of Obstetrics, February 7, 1902.]

THE case which I am about to place before you presents such points of interest to the obstetrician that I have thought it worthy of bringing it before the members of this Section of the Academy. As well as the general interest in the subject, it has certain peculiarities which I have not met with in any of my previous experience. I have added to my note extracts from authorities on the subject which I hope may be of interest to some of our members.

Mrs. K., aged thirty-four, mother of one child who had died, was brought to me on March 18th, 1901. She was then pregnant four and a half months. She was complaining of sacral pains and constipation. I examined her in my study, and found that she had a fibroma springing from the posterior wall of the cervix extending towards the hollow of the sacrum. It seemed to me to be about the size of a hen's egg, and to encroach very little on the cervical canal. I thought that it would be possible to deliver her with forceps without having to operate on the tumour, provided that she returned to town within three months from that date, that the tumour had not appreciably increased in the meantime (it being well known that these tumours sometimes increase enormously under the stimulus of pregnancy), and that I was successful in inducing premature labour. I wrote to her medical adviser and asked him if he would watch the patient, and by examination from time to time assure himself that the growth was not getting much larger. In case he thought it increasing at all she should be sent up to town at once. I heard nothing more

about this patient until she came to town, except that she was going on well and that the growth was not appreciably enlarged; her backache and constipation had been much better and her general health had improved. On June 17th she again came to town and went into lodgings. On the succeeding day (Tuesday, the 18th), the bowels having been well cleared out, Dr. Fleming saw her with me; we both examined her very carefully and agreed that the condition afforded a good chance of being able to deliver her, and that labour should be induced. The patient having been properly prepared, a No. 9 bougie was introduced through the cervix, and then between the membranes and uterine wall until its whole length, except the head of the instrument, was within the uterus; the vagina was packed with iodoform gauze. Next morning (Wednesday, the 19th) she was found to be in labour, the gauze and bougie were removed and patient thoroughly douched. These pains were regular and dilated the os, although they were not very strong. By the evening the os was the size of a crown piece; these pains continued all Wednesday night, so that the patient could not sleep. On Thursday morning, the 20th, little or no advance had been made, the os was a little bigger than the preceding night, about 1¾ ins. in diameter, admitting two fingers easily; membranes were ruptured, head presented, but did not engage, owing, undoubtedly, to the tumour. The patient was more or less fretful, owing to the want of sleep principally. As this condition was unsatisfactory, we now determined to put the patient under chloroform and make a thorough examination; this having been done, we found that the tumour was larger than we had at first supposed, and that it invaded more of the lower zone of the uterus than we anticipated, thus not only preventing the head from engaging in the pelvis, but preventing the cervix from dilating. Owing to the previous injury to the perinæum it was found possible to introduce the whole hand into the vagina without much difficulty, and when this was done, with two fingers in the os and the thumb outside, one could get the fingers above the upper border of the tumour. Having discussed the case, and the fœtal heart being heard, distinct and strong, it seemed that the alternative open to us was either to try enucleation of the tumour through the vagina or to proceed to cœliotomy and Cæsarean section or Porro's operation. The patient refusing to go to hospital, we had to face the increased risks of septic infection where she was.

So taking into account that there might be less risk if we did *not* open into the peritoneal cavity, also the fact that as far as we could find there was only the one tumour, we decided to try enucleation by the vagina. If we succeeded in removing the tumour, and that the premature child did not survive, yet the mother, supposing she recovered, would have a chance of having a living child should she again become pregnant. Having made our preparations, and assisted by Dr. Neill, who administered the anæsthetic, we proceeded to enucleate the tumour. The vagina having been thoroughly douched and cleansed, Dr. Fleming was able to draw down the tumour between two fingers so that I could see the tumour at the vulva (patient was in the cross-bed and lithotomy position). The capsule of the tumour was rapidly incised, and the tumour was then enucleated by the fingers, first being caught by a vulsellum forceps. This was followed by rather profuse hæmorrhage; part of the capsule of the tumour had been torn during enucleation, as preliminary incision had not been quite long enough. This injured portion and some of the redundant tissue surrounding the tumour were cut away with scissors. Then portion of the flaps was stitched with chromicised gut, leaving sufficient aperture to introduce a packing of iodoform gauze. This was introduced after the cavity had been well cleared of any clots and thoroughly washed out with hot creolin solution; the catheter was then passed and a quarter of a grain of morphia administered in the form of a suppository. The operation of enucleation was performed about 5 or 6 o'clock in the afternoon. Pains or, in other words, uterine contractions continued until about 1 a.m., when they ceased, and after which the patient passed a quiet night. On the following day (Friday) the iodoform gauze packing was removed and the cavity syringed with hot creolin solution. The hæmorrhage had been controlled by the packing, but recurred to a slight extent when the latter was removed. After the syringing it was again packed. No uterine pains or sensible contractions occurred at all on Friday, and the patient again passed a quiet night. There was no longer any necessity to pass the catheter, and the bowels acted after a dose of liquorice powder.

On Saturday the gauze was removed and the cavity washed out with creolin solution by means of a large Bozeman catheter. As no fresh bleeding took place at the time, the packing was not

reintroduced, with the idea that the cavity would shrink up better without it. Some gauze was put loosely in upper part of vagina. On Sunday the pulse was rather quick—112; temperature 101°. Patient complained of headache. The cervix, which had been closing since Friday, would not now admit the tip of the finger. No discharge came from vagina, which was simply douched with creolin solution. Ten grains of phenacetin had the effect of relieving the headache for the time, and the skin reacted well. Sunday night, however, the patient was very restless, and on Monday morning the temperature was again up to nearly 102°, pulse 120. Complained much of headache. There was a brownish discharge from vagina, not very profuse, but somewhat fœtid. This called for an immediate exploration of the condition of the cavity. Where the tumour had been the opening was found with some difficulty; it was then discovered that some further hæmorrhage must have taken place into this sac which had clotted, and the brownish discharge came from this source. The clots were turned out with the finger as well as possible, and the cavity again well washed out with creolin solution, then packed again with the iodoform gauze. This brings us to Monday; each day after this for three or four days the same treatment was adopted with the cavity, which daily contracted rapidly; the temperature, which for a couple of days remained between 101° and 102°, came down to 99° by the succeeding Saturday. The pulse remained fast at first, but came down to about 84; she complained a good deal of headache and night sweating; her strength was kept up by strong beef tea, chicken jelly, eggs, custards, egg flip, and white wine whey. She was rather a difficult patient to manage; although there was no incontinence of urine, or involuntary passage of fæces, on more than one occasion the bed was wet under her with urine, and on one occasion certainly there was some evidence of fæces also. This happened on the Saturday night following the operation, and possibly may have accounted for the condition of the patient on Sunday and Monday. The nurse in charge of the patient had been called away suddenly to see some other patient, and had left my patient in the hands of her daughter, who was only a probationer at a nursing institution, and had only then completed some weeks of training. Needless to say asepsis under those conditions was impossible; the nurse was reprimanded for leaving her patient, and I must say expressed great contrition

and nursed her remarkably well afterwards, but the harm had probably been done then. On the following Sunday morning labour pains again came on, and the child was born so rapidly that I was not there until after its birth. The child, a female, was born alive. There was no trouble with the placenta and no post-partum hæmorrhage. A douche of creolin solution was given before the binder was applied. All that day she seemed very well, until about 8 30 in the evening I was summoned to find she had had a severe rigor and the temperature had gone up to 106·4°, pulse 144. The uterus was well contracted. However, to be on the safe side I gave her an intra-uterine douche of creolin solution. She then got 15 grs. of phenacetin and ½ oz. of whiskey every two hours. She complained of no pain or tenderness over the abdomen, and did not look badly. The facies was good. The temperature was taken by myself twice in the vagina, so as to prevent any possibility of a mistake. Next morning her temperature was down just below 104°, pulse 120, and her headache had reappeared. Uterus well contracted, lochia good colour and good quantity. The Bozeman could only be introduced into the cavity where cyst had been. It was thoroughly syringed. Following day temperature fell to 101°, and there was some secretion in breasts. Uterus hard, involuting well; lochia still healthy; vagina still well douched. Stimulant was still administered, but in diminishing quantities. The child, which had been fed up to this on white wine whey, was now put to the breast, the breast milk being supplemented for some days by white wine whey; it ultimately was able to do with the breast milk alone, on which it throve well. The patient's condition rapidly improved, and she was able to return to the country within four weeks of the birth of her child. For the first week she got fairly large doses of quinine—12 to 16 grs. daily for three or four days, after which the dose was gradually diminished. I heard from this patient at Christmas, and both she and her child were in perefct health. Before she went away it was very difficult indeed to see any trace of what had been done in removing the tumour—some slight puckering, and that was all.

The life-history of these uterine tumours is one of exceeding great interest to the obstetrician and operating gynæcologist. As regards their ætiology nothing very definite has been

agreed upon, the most generally accepted theory being that of "irritation" as a provoking cause, whether that irritation arises from endometritis, metritis, gestation and parturition with septic absorption, or by the presence of some micro-organisms in the uterine walls, as has been suggested by Byford. Winckel thinks they spring from uterine inter-parietal blood vessels; Klebs from the connective tissue of blood vessels; Kleinwachter (according to Martin) ascribes their parentage to a round-celled formation found along the capillaries; while W. Anderson says they are "localised or diffuse hypertrophies or developments of embryonic (mesoblastic) uterine parenchymatous tissue." A. Aubeau refers them all to a syphilitic origin, but this theory cannot stand with our everyday clinical experience. Ricker, in *Virchow's Archiv.*, 1895, speaking of the origin of fibroids in the uterus, "thinks there is strong reason to believe myoma has usually an embryonic origin. In some cases distinct epithelial relics are found in myoma which seem to represent the remains of the primitive epithelium of Müller's duct. Relics of the Wolffian duct are decided to be found in the uterine wall. He is as certain as Coblenz as to the persistence of that duct and its relation to new growth. Abnormal in-growths of muscle cells around the duct are represented in Ricker's drawings. Hence it is probable that every myoma originally arises from some abnormal growth of muscle around the Wolffian duct in the uterine wall or around epithelial *débris* from the Müllerian duct, relics which may even be distinct diverticula not entirely effaced after fusion of that duct with its fellow to form the uterus." As regards the time at which they may appear, there does not seem to be any trustworthy history of myoma in the uterus before the age of twenty. Several have been observed between twenty and twenty-five. The maximum frequency is between thirty-five and forty-five. J. Bland Sutton states that "all uterine

myomata arise during the menstrual period of life." That such growths are far more frequent than is generally supposed is proved by observations in the dissecting room. Klob, according to W. Anderson, maintains that 40 per cent. of women dying after fiftieth year have uterine fibroids. Bayle states that 20 per cent. of women over thirty-five show fibromata. Winckel, in 575 autopsies, found only 12 per cent., but age is not stated. Of 135 women under thirty-five years of age only 5 per cent. had fibroids. We see from these statistics that although authorities differ yet the rate per cent. is very high. Pozzi states that these tumours are much more frequent in black women than in white, while as exciting cause Fehling "attributes great importance to incomplete involution after labour and abortion where a sufficient period of rest is not enjoyed." Ninety per cent. of these tumours develop in the body of the uterus, 10 per cent. or less in the cervix. As to their site with regard to the cavity of the uterus, F. H. Martin says 10 per cent. are submucous, 15 per cent. intramural, 20 per cent. subperitoneal, and 55 per cent. interstitial (diffuse). These tumours in their life history undergo many changes; they sometimes tend to become pedunculated, whether on the serous or mucous surface of the uterus, they may undergo necrosis, or calcification, or involution and absorption, they may become cystic or sarcomatous. Absorption or involution of these tumours often occurs when they have been associated with pregnancy, or after the menopause, when usually a general atrophy of all the genital organs takes place. The very effect of lactation on these tumours has led to experiments in that direction. Howitz Kopenhagen discusses the effect of lactation in involuting the uterus after pregnancy and its power in causing diminution and absorption of myomata. He narrates the history of two patients who were under treatment for intramural tumours—both became pregnant and went to full

term. One suckled her child, and in four months tumour had decreased; the other had not sufficient milk, could not nurse, and tumour was unaltered. Based upon this he experimented on seven cases who were not pregnant; he tried artificial suckling or aspiration of the nipple. In four cases secretion of milk was induced, in two cases they refused to respond to the treatment, and one was not long enough under treatment to be sure of any result. In three the tumour decidedly decreased in size, in three the measurements remained the same, in only one was hæmorrhage decreased. Aspiration lasted from "five to ten minutes morning and evening," but his intention was to try it oftener so as to imitate as nearly as possible the process of natural lactation. A greater percentage of these tumours in pregnancy is prevented by the fact that the growth predisposes to sterility by usually producing an endometritis. Lefour noted thirty-nine cases of abortion in 309 cases, and Nauss recorded forty-seven abortions in 241 cases (Dorland). The number of these tumours in the uterus and their situation are of great importance to the obstetrician. Where there are many tumours the condition of pregnancy is not likely to co-exist, but if it does the risks of interference with labour or of removal of tumour is increased *pari passu* with their number. A fibroid tumour of very considerable size may grow near the fundus and give rise to very little trouble, some authorities say *no* trouble; for my part, however, I question this, as such tumours may interfere with the position of the child in the uterus, must interfere more or less with the regular contractions and retractions of the uterine muscular tissue, and therefore predispose to prolonged labour, and for the same reason may cause increased risk of post-partum hæmorrhage, of irregular contractions causing retention of the placenta, and later may interfere with the normal progress of involution. A tumour low down and situated on the anteror wall of the

cervix is not so dangerous as one on the posterior wall, as vigorous contractions of the uterus may result in carrying it upwards out of the pelvis; whereas the sacro-vertebral angle being about 3 ins. or more higher than the upper border of symphysis pubis, if the tumour spring from the posterior wall it becomes impacted in the hollow of the sacrum by the promontory, and obstructed labour is the result. In such a labour—should it be prolonged—the injury to the tissues owing to pressure may be such that sloughing may result. With regard to the treatments that are open to choose from, we have inducing abortion, myomectomy, enucleation (if in cervical wall) and Porro-Cæsarean. (Dorland says the mortality of those going to term is high—mothers 53 per cent., children 66 per cent.)

Kelly says questions to decide with regard to treatment are—(1) whether pregnancy can occur in a given case; (2) when pregnancy exists whether the life of the mother is in danger or not; (3) whether a living child can be carried and born at term. Kelly's own statistics, prepared by Dr. J. H. Durkee, 236 married women with myomatous uteri had 542 pregnancies, 402 children born at term, 140 miscarriages; average number of pregnancies for each woman was 2·03. He lays down the following axioms of treatment regarding surgical interference with the uterus before the last months of pregnancy—that is to say, before the viability of the child:—

(*a*) Remember two lives are involved; if possible save both, rejecting all radical measures unless symptoms be urgent. Mere prophylaxis—that is, operating when there is no urgent symptom on account of dangers which may arise—has no field here.

(*b*) Small and medium-sized fundal fibroids do not demand operation.

(*c*) Intra-ligamentary and sub-peritoneal cervical fibroids do not demand operation, unless of such a size and so located as

to encroach on pelvic room or the superior strait in such a way as to prevent labour. Pedunculated fibromata which can be pushed up into the abdomen do not justify interference during pregnancy.

(*d*) Intestinal tumours should not be touched if the operation can possibly be avoided, for they require so much handling and suturing of the uterus that abortion almost always follows.

(*e*) Operation may be demanded on account of severe pain caused by fibroid tumour.

(*f*) Operation may also be called for owing to rapid growth of tumour during pregnancy.

(*g*) Pedunculated fibroid tumours (polyps) hanging out of cervix into vagina may be removed.

(*h*) When the patient has gone almost to term if the fibroid masses are so large as to necessitate a subsequent hysterectomy in case they are left, then it is better to deliver the child by a Cæsarean section and to remove the uterus at the same time.

The greatest risk of error in these cases is in removing a uterus with fibroids where the tumours might at a later date be removed without the sacrifice of the uterus. A sessile tumour so placed in the pelvis as to obstruct labour may be removed without much risk of causing abortion. Kelly performed the operation three times for sessile tumour before the sixth month without interrupting pregnancy.

G. Aimé and R. Frommel have extirpated intra-ligamentary myomata successfully without interrupting pregnancy. Kircheimer estimates the mortality of 18·87 in myomectomy for pedunculated fibroids and 26 per cent. in supra-vaginal amputation of the pregnant uterus, while premature interruption of pregnancy is as high as 40 per cent. Many others have been recorded in American literature.

In reviewing the various statistics there is of necessity considerable difference between the results of different

operators and different observers, but one point is certain, and that is, that the conservative operations where both mother and child can be preserved are being accompanied by progressively improving statistics, and this result is largely due to the improvements in the technique of abdominal surgery, and a rigid adherence to the principles of asepsis.

I fear I have trespassed much upon the patience of the members of this Section, and I must apologise if my communication has reached a much greater length than I originally intended.

Dr. Alfred Smith thought Dr. Kidd would have had a better idea of what was to be done had he examined the patient under an anæsthetic. He (Dr. Smith) makes it a rule to examine under an anæsthetic before deciding on any course of action. He would argue against inducing labour. If easily enucleated, the labour might run to full term; if not, there was the Cæsarean section. When the tumour is situated at the upper portion of the lower segment, it is drawn up during the process of labour.

Dr. W. J. Smyly said that tumours of the cervix are very uncommon. He remembers Dr. Kidd's uncle (Dr. George Kidd) saying that he never saw one. When a tumour lies directly in front of the head he thinks it should be removed. "On and off" labours are not infrequent in cases of myoma. He had seen such an "on and off" labour continued for a fortnight.

Dr. Kidd, in reply, stated that he quite agreed that an examination prior to deciding on the operative treatment is the proper course, but the conditions of this case were exceptional. The patient had a large, roomy pelvis with a big vagina, which in the previous confinement had been lacerated and never repaired. Last year he had a somewhat similar case, in which, on the advice of Dr. Smyly, he did not operate, and the woman went to full term and bore a healthy living child; she was warned that if she again became pregnant she should come into the hospital not later than the seventh or eighth month. When next heard of the patient was in labour, and had been so for seventy-two hours. He put on the forceps and delivered her—during the operation he found that the tumour had flattened out, and the child's head successfully passed it without injury.

CLINICAL REPORT OF THE ROTUNDA LYING-IN HOSPITAL, FOR ONE YEAR, ENDING NOVEMBER 1ST, 1901.

By R. D. PUREFOY, M.D. T.C.D., F.R.C.S. (Master);

and

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[Read in the Section of Obstetrics, March 14, 1902.]

During this year 1,905 women were admitted to the Maternity Department, of whom 1,610 were confined, and nearly 300 were discharged not in labour. Amongst those treated will be found examples of some of the rarest concomitants of pregnancy and childbed, such as emphysema, puerperal aphasia, and pulmonary embolism. During the year three deaths occurred. No. 1.—Patient moribund on admission; in acute phthisis. No. 2.—An emaciated, cachectic patient, some days in labour before admission, who succumbed after Cæsarean section, rendered necessary by uterine fibroids. No. 3—An elderly patient with contracted pelvis, in whom the induction of premature labour was unusually protracted and difficult owing to uterine inertia and morbid adhesion of placenta.

Table No. I.—*Admissions to Maternity Department.*

—	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
Total deliveries	120	136	121	129	138	130	130	123	136	126	133	125	1,547
Total abortions	3	2	7	4	4	6	7	2	3	9	8	8	63
Total cases treated	123	138	128	133	142	136	137	125	139	135	141	133	1,610
Patients discharged not in labour	20	24	20	22	23	21	26	22	37	26	26	28	295
Total admissions													1,905

TABLE No. II.—*Dispensary for Out-Patients.*

Number of first attendances,	4,110
" repeated "	6,631
Total,	10,741

TABLE No. III.—*Showing Nature and Number of Cases Treated in the Extern Maternity*, 1900–1901.

Total number of cases	2,175	Operations—	
Abortions	286	Curetting for abortion	200
Fœtal abnormalities—		Forceps	38
Anencephalus	1	Manual removal of placenta	15
Hydrocephalus	2	Version	3
Hydatid mole	1	Craniotomy	1
Hæmorrhage—		Presentations—	
Accidental	18	Breech	36
Placenta prævia	6	Brow	1
Post-partum	27	Face	8
" secondary	—	Footling	20
		Head and arm	1
		Hand and foot	—
Hydramnios	2	Occipito-posterior	32
		Shoulder	1
Hæmatoma vaginæ	1	Transverse	4
		Elbow	1
Inversion	—		
Mortality, infantile—		Prolapse of funis	7
Macerated	11		
Non-viable, premature	36	Rupture of uterus	2
Recent	45		
		Contracted pelvis	3
Mortality, maternal	4		
		Spina bifida	1
Multiple pregnancy, twins	22		
Female		Arrested breech	3
Male			
Mixed		High forceps	1

Table showing Number and Treatment of Cases of Accidental Hæmorrhage in Extern Maternity.

Name	Variety	Date	Age	Preg.	Treatment	Child	Mother
1. S. S.	External	Nov. 4	36	xv.	Plug	D.	A.
2. M. O.	,,	Feb. 14	37	xiv.	,,	D.	A.
3. C. S.	,,	Apr. 26	24	ii.	Plug at first, then rupture of membranes and forceps	D.	A.
4. — M.	,,	May 14	26	iii.	None. Child born before arrival	D.	A.
5. M. F.	,,	,, 19	40	ix.	Plug	D.	A.
6. M. M.	,,	June 4	38	ix.	,,	D. B.	D. (collapse)
7. M. T.	Internal	,, 12	?	vii.	Membranes ruptured	D.	D. (septic)
8. A. B.	External	,, 30	24	ii.	Plug	A.	A.
9. B. B.	,,	July 2	40	xii.	Membranes ruptured	A.	A.
10. L.M'L.	,,	,, 15	25	iv.	Plug	D.	A.
11. M. R.	,,	,, 20	?	?	,,	D.	A.
12. M. L.	,,	,, 31	30	iv.	,,	D. B.	A.
13. M. C.	Internal	Aug. 31	?	iv.	Plug first and forceps after	D.	A.
14. — C.	,,	Sept. 8	36	iii.	Plug	D.	A.
15. — F.	External	Oct. 23	40	xiii.	,,	D. 8	A.

In case 3 when the tampon was removed the os (which at the time of its application was closed) was found fully dilated, and good pains had set in.

In case 7, on examination the os was half dilated, membrane bulging, and good pains present.

In case 9, patient was in good labour and os fully dilated.

EXTERN MATERNITY—INTERESTING CASES.

Prolapse of Cord; footling.—M. Q., aged twenty-six; in labour 26 hours; 2-para. Difficulty with arms and head, but child was delivered alive.

Arrested Breech.—F. M., aged thirty four, 8-para; 56 hours in labour. Traction proving unavailing, a leg was brought down and labour completed; child stillborn.

Twins and Hydramnios—F. G., aged thirty-eight, 5-para. More than seven quarts of liquor amnii were drawn off. Patient came into labour next day; both children born alive.

High Forceps.—Contracted pelvis; c.v. 3¾ inches. M. H., aged thirty-eight, 4-para; 60 hours in labour. Os fully dilated 12 hours; head still above brim. Forceps applied, and head drawn past promontory with much difficulty; mother and child both well.

Placenta Prævia Lateralis.—Transverse presentation. A. M., aged thirty, 6-para. Os well dilated. Hand, foot, and cord in vagina simultaneously. Placenta felt on left side. Chloroform; internal version; child born alive.

Rupture of Uterus and Vagina.—M. M., aged thirty-six, 9-para, was seized in the seventh month with pain attended by bleeding; os undilated; pulse quick; vagina tamponed. In a few hours pains came on, and in an hour afterwards sudden collapse took place. The tampon was removed, and in a few minutes fœtus, placenta and large clots were expelled. A large rent was found in left fornix, extending into broad ligament. Iodoform gauze was passed into rent, and transfusion was begun, but the patient rapidly expired.

Arrested Breech.—E. M., 1-para; 52 hours in labour. Delivery effected with great difficulty by traction in groin. Some difficulty in the after-coming head. Child alive.

Hydatidiform Mole.—S. D., 4-para. Strong pains with expulsion of fragments some hours before visit. Uterus reaching half way to umbilicus. Removal effected by finger and curette; excellent convalescence.

Brow Presentation.—M. J., 6-para; 10 hours in labour; escape of meconium; large scalp tumour. Forceps delivery; female. alive.

Hydrocephalus and Spina Bifida.—Footling presentation. E. D., aged twenty-six, 3-para. Breech born before arrival; much difficulty with head.

Placenta Prævia Lateralis.—E. B., 3-para. On arrival, os found one-third dilated; head and placenta felt. Bipolar podalic version, followed in due time by good pains and the birth of a stillborn child good recovery.

Footling Presentation and Premature Labour complicated with advanced Phthisis.—C. H., aged thirty-six, 10-para. On arrival knee was found at vulva; delivery easily effected; no bleeding; patient died same evening.

Hydrocephalus; Perforation.—E. D., aged thirty-eight, 6-para; 72 hours ill. Membranes ruptured some days before; os half dilated. Perforation performed; labour completed unaided soon after; fœtus stinking. Patient made a good recovery.

Placenta Prævia Marginalis.—M. L., 5-para; os three-fifths dilated; placenta easily reached. Bipolar podalic version; good labour pains ensued and completed labour. Patient at seventh month. Fœtus dead.

TABLE No. IV.—*Showing Number and Nature of Cases Treated in the Intern Maternity.*

Total number of cases	1,616	Insanity	1
Primiparæ	549	Morbidity	82
Abortions	64	Moles, hydatid	
Phlebitis	1	Mortality, infantile—	
Deformed pelvis	15	Macerated	40
Eclampsia (6 threatened)	2	Putrid	5
Epilepsy	3	Premature	8
Erythema	7	Non-viable	
Œdema of Cervix	1	Recent	32
,, ,, Vulva	7	Died in hospital	20
Ascites	1	Mortality, maternal	3
Hæmorrhage—		Mummified Fœtus	1
Accidental	19	Imperforate Anus (cured by operation)	1
Placenta prævia	9	Multiple pregnancy—	
Post-partum	36	Twins—	
,, secondary	1	Female 4	
Hæmatoma vulvæ	1	Male 2	
Hydramnios	14	Mixed 8	— 14
Hyperemesis	1	Syphilis	4
		Myoma uteri	8
		Aphasia	2

TABLE IV.—*continued.*

Operations—		**Diseased infantile conditions—**	
Forceps	66	Anencephalus	1
Induced abortion	3	Cephalhæmatoma	8
Induced labour	5	Hydrocephalus	4
Manual removal of placenta	34	Icterus	277
Version	10	Mastitis	
Cæsarean section	1	Ophthalmia	4
		Spina bifida	3
Physometra	1	Hare-lip and cleft palate	2
		Monster	1
Presentations—			
Breech	43	**Prolapse of funis**	10
Brow	1		
Face	5	**Puerperal ulcer**	2
Footling	8		
Occipito-posterior	20		
Transverse	6	**Rupture of uterus**	

INDUCTION OF ABORTION.

This proceeding was found necessary in three cases:—

CASE I.—Patient a 1-para, aged twenty-eight; four and a half months pregnant; considerable hæmorrhage before admission. Five laminaria tents were inserted in cervix, and vagina plugged with cotton wool. This was removed in twelve hours, when fœtus and placenta were found lying in vagina, and the uterus was curetted.

CASE II.—Patient aged thirty-eight, 7-para; six months pregnant; in hospital some days without hæmorrhage; discharged and re-admitted in three weeks' time owing to return of bleeding, preceded for some days by watery discharge. Five laminaria tents were inserted and vagina plugged. Twenty-four hours later tampon and tents were removed, when the os was found large enough to admit two fingers. The head was pushed up and a foot brought down. The placental insertion was within reach. Thirty hours later the fœtus was expelled, and the placenta, which was partially adherent, was removed with the curette.

CASE III.—Patient aged thirty-two, 6-para; four and a half months pregnant; intermittent hæmorrhages, increasing in severity, had lasted for some weeks. Nine tangle tents were inserted, and vaginal tampon applied. Next day the uterus was emptied with the aid of Schultze's spoon forceps and plugged with iodoform gauze Patient discharged on 8th day.

TABLE No. V.—*Cases of Contracted Pelvis.*

Date	Name	Age	Para	Pelvic Measurements					Mode of Delivery	Result to Child	REMARKS
				C. V.	Trans.	Ext. C.	I.-C.	I.-S.			
Jan. 8	L. M.	23	I.	9·7	—	18	26·25	22	Unaided	7¾ lbs. A.	—
Feb. 26	A. S.	32	VII.[a]	9·5	9·5	—	—	—	,,	8 ,, A.	—
Apl.	S. M.	36	IV.[a]	9	10·25	18	27	22·75	Podalic version	5½ ,, D.	Labour induced at 8 months
,,	E. B.	32	III.	9	21·75	19·5	27	23¼	Forceps	5¼ ,, A.	Do. do.
..	M. M.	34	I.	—	—	—	—	—	,,	8 ,, A.	Some transverse narrowing at outlet
May 14	M. P.	30	V.[a]	8·5	9·25	—	—	—	,,	9¾ ,, A.	Much difficulty with shoulders
June	M. G.	40	IV.	86·5	13	17	27	24	Podalic version	7½ ,, D.	Placenta morbidly adherent and had opisthotonos for some days
,,	E. B.	25	I.	8·2	10·25	17	29	24	High forceps	8¼ ,, A.	Child Schultzed for an hour and a half
,,	J. D.	19	I.	8·4	12·25	19	29	25·5	Unaided	8½ ,, D.	Exostoses at symphysis and promontory. Short second stage
Jul. 11	R. M.	38	VI.	10	10	—	—	—	Breech pres.; foot brought down	9 ,, D.	All previous labours instrumental, children stillborn, and placenta, as now, morbidly adherent
,, 27	A. M.	30	III.	7·5	12·50	19	29·5	25	Unaided	8½ ,, A.	Forceps in a former confinement
Aug.	E. C.	38	X.[a]	—	—	—	—	—	—	5¾ ,, A.	Labour induced eighth month. This is the third time, and a living child was born each time
Sept. 5	M. B.	36	V.	10	9·5	—	—	—	Unaided	5¼ ,, D.	All previous labours instrumental: children dead; labour induced. Patient died septic twenty-first day
Nov. 8	M. D.	30	IV.[a]	9·75	11·5	—	—	5·75	,,	5 ,, A.	See former Report—Cicatricial vaginal band divided to allow delivery. Labour induced as on former occasions at 7½ months. Transverse at outlet
Dec.	M. H.	42	XI.	9·35	12·3	—	28	25·5	High forceps	8¼ ,, A.	Deep groove on left frontal bone of infant

[a] See Report, 1900.

As will be seen from the Table, fifteen cases of contracted pelvis came under treatment. Five of these had undergone similar treatment in this hospital before, and on this occasion all but one were delivered of living children. In five premature labour was induced (see Table). Six of the fifteen were delivered by natural efforts. Delivery was effected with the forceps in five cases, and in two of these the high operation was found necessary. Podalic bipolar version was performed in two cases, and in one, which presented by the breech, a foot was drawn down.

ACCIDENTAL HÆMORRHAGE.

Of the nineteen cases recorded in our Table it will be seen that nine did not call for active interference, beyond supporting the fundus with hand or binder, and occasionally the administration of quinine. In four rupture of membranes was resorted to with excellent results. In seven cases the vaginal tampon was used with the admirable results which, as our former Reports amply demonstrate, follow its use.

In Case 1 os was dilated to the size of a florin, and membranes bulging under the influence of good pains.

Case 3.—Patient in strong labour. Os as in Case 1.

Case 6.—In consequence of oozing six hours after application of tampon, it was removed and the membranes ruptured, as os was fully dilated. Shortly afterwards the uterine contents were expelled naturally.

Case 13.—Patient's condition good at time of admission, and as pains were active and os fairly dilated, the membranes were ruptured.

TABLE No. VI.—*Accidental Hæmorrhage.*

Name	Date	Age and Para	Variety	Treatment	Result to Child	Remarks
1. M. C.	Dec. 16	22, II.	External	Rupture of membranes	D.	Labour at 7th month; child 3¼lbs.
2. C. W.	,, 24	19, I.	,,	Tampon	D.	Labour at 8th month; child macerated; U. spongy on palpation at left side
3. J. K.	,, 30	39, IX.	Concealed	Rupture of membranes; forceps	A., D.	Twins; no external bleeding; clot 2lbs. followed birth of first child; forceps used with both children
4. L. K.	Nov. 17	23, I.	External	Tampon; hot douche	D.	Premature; 7th month; child 3¾lbs.
5. R. K.	,, 30	28, I.	,,	Unaided	A.	Labour at 7th month; child 3lbs.
6. C. H.	Mar. 11	36, X.	Mixed	Tampon and rupture of membranes	D.	Admitted in collapse; severe epigastric pain; large quantity of clots expelled with child
7. A. R.	Feb. 13	20, II.	External	Unaided	D.	Fainted before admission; no fœtal heart audible; good labour pains; large retroplacental clot
8. M. R.	Apr. 5	32, XI.	Mixed	Tampon and forceps	D.	Pain and syncope before admission; 7th month; U. tense, reaching to ensiform; no fœtal outline or heart
9. J. R.	,, 16	21, I.	External	Unaided	D.	Eclampsia; 7th month; urine highly albuminous
10. M. B.	Jun. 26	36, VIII.	Concealed	Tampon	D.	Pain and syncope; uterus very tense and painful; good pains followed tamponing; fluid and clotted blood in very large quantities followed birth of child; labour at term

TABLE No. VI.—*continued.*

Name	Date	Age and Para	Variety	Treatment	Result to Child	Remarks
11. E. C.	July 27	19, I.	Concealed	Unaided	D.	Premature
12. M. C.	Aug. 11	39, IX.	Mixed	Forceps; tampon	D.	Occipito-post., at full term; large clot expelled with placenta
13. S. L.	„ 25	27, V.	External	Ruptured membranes	D.	Child 5lbs.
14. L. K.	July 29	24, II.	Concealed	Unaided	A.	Premature; child 4¾lbs.
15. C. D.	Oct. 24	23, IV.	External	„	D.	Macerated hydrocephalic fœtus
16. K. M.	„ 30	23, I.	Concealed	„	A.	Placenta showed large area of detachment
17. M. J.	Sept. 4	24, II.	External	„	A.	Child 8lbs.
18. M. M.	„ 17	31, III.	„	Tampon	A.	Quinine 5 grs. administered
19. E. T.	„ 8	40, X.	„	Unaided	D.	Premature; quinine 5 grs. administered

TABLE No. VII.—*Placenta Prævia.*

Name	Date	Age and Para	Variety	Presentation	Period	Result to Child	Remarks
1. K. R.	Dec. 1	36, VI.	Lateral	Vertex	Term	A.	Born 15 minutes after admission
2. M. J. B.	„ 1	35, X.	„	Breech	6 months	macerated	Rupture of membranes
3. J. P.	„ 16	24, III.	„	Twins	4½ „	—	„
4. K. M.	„ 21	19, I.	Complete	Vertex	8 „	D.	Podalic version
5. M. B.	Jan. 14	27, VI.	„	—	6 „	D.	—
6. M. H.	Apl. 30	36, IX.	„	Twins	Term	A.	—
7. R. D.	July 17	42, III.	Marginal	—	„	A.	Bipolar . podalic version
8. F. O'C.	Aug. 24	23, V.	„	Footling	7½ months	macerated	Hydramnios; membranes ruptured
9. A. M'E.	„ 30	38, VIII.	„	Vertex	6 „	D.	Induced abortion; version. *See* Case 2 under this heading

Taking the cases in this table with those enumerated in the Report of last year we have a total of 25 consecutive cases of placenta prævia without any maternal fatality. Though the number of cases of placenta prævia admitted to hospital during the year was much smaller than in the preceding, it is gratifying to be able to record the satisfactory convalescence of all the mothers, and the birth of a living child in the three cases which went to term. Bipolar podalic version was resorted to in two cases. In three cases rupture of membranes was practised. In the case of J. P. (twin pregnancy) one placenta was prævia, and expelled from uterus and vagina before the birth of either fœtus. In the case of M. H. (twin pregnancy) both fœtuses presented by the vertex, one placenta being prævia. F. O'C., aged twenty-three, was admitted in her fifth pregnancy in very bad health, with temperature of 101·6° F., and pulse 115. She gave a history of hæmorrhage, and on examination the os was found half dilated, membranes and portion of placenta protruding. Rupture of the former gave exit to several pints of greenish, stinking fluid, followed shortly afterwards by a macerated fœtus.

POST-PARTUM HÆMORRHAGE.

There were seven cases of rather severe hæmorrhage, four of which were associated with adherent placenta. One occurred in a case where rupture of membranes had taken place four days previously, followed by a tedious labour. In twenty-nine cases the bleeding was inconsiderable, despite the fact that in eleven of these manual removal of the placenta was found necessary, and in seven cases forceps had been applied. In two of them the birth of twins was followed by post-partum hæmorrhage, and in a similar number hydramnios was present, associated with adherent placenta. In one the hæmorrhage occurred two

hours, and in another one hour, after delivery. There was only one case of secondary hæmorrhage—viz., in the case of K. W., where bleeding took place on the seventh evening. On examination the uterus was found retroflexed, and the cavity occupied with a considerable quantity of clots. In no case of post-partum hæmorrhage was plugging of the uterus found necessary.

HYPEREMESIS.

This distressing accompaniment of pregnancy was observed in three instances:—

CASE I.—K. N. was a 1-para, aged twenty-eight, admitted June 25, who had been treated in the dispensary during several months previously for extensive perimetritis and retroflexion. For several days before labour began vomiting was almost persistent, and but for the fortunate advent of pains active interference would have become necessary.

CASE II.—B. D., aged thirty-four, 10-para, admitted May 16. Of the ten pregnancies six ended at term and four at the 2nd month. With the latter no sickness occurred. In the first and fifth pregnancies vomiting was persistent throughout; during the sixth and eighth it was absent. In the tenth vomiting began at the eighth month, slight at first, occurring in the morning only, but later increasing in severity, and persisting through the day. It is noteworthy that it was always absent at night. Vomited matter was watery, but never mixed with blood. Constipation generally present. Vomiting ceased immediately after delivery. Apart from pregnancy, the menstrual history was normal, and general health excellent.

CASE III.—A. G., aged thirty-four, 1-para, admitted June 22. Had persistent vomiting throughout pregnancy. Aspect and complexion bad; marked emaciation and general pigmentation were observable. Marked abatement of the sickness occurred when the head engaged in the pelvis; but owing to its recurrence during labour it was deemed wise to give assistance with the forceps after a short second stage.

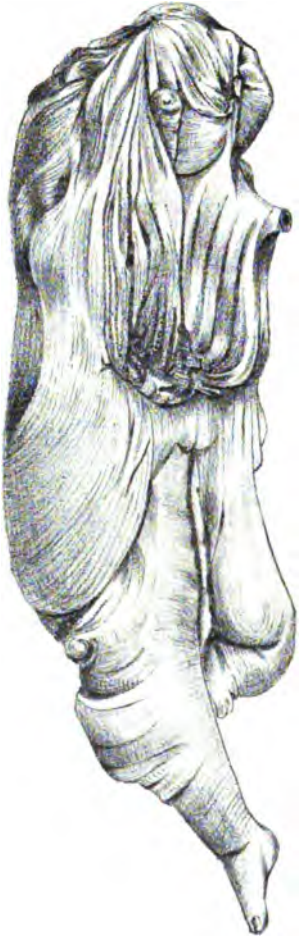
HYDRAMNIOS.

There were fourteen cases of hydramnios, amongst which there were three cases of twins, thirteen children born alive, two complicated with adherent placenta, and one with placenta succenturiata. One of the living children, which was affected with spina bifida, lived only two days. Four children were stillborn. One of these was anencephalic, exhibiting also congenital luxation of both knee-joints and double talipes varus. Another, which died at birth, presented on *post-mortem* examination double diaphragmatic hernia and extraordinary transposition of viscera. The stomach, cæcum, small intestine, and one lobe of liver lay in left thorax. Imbedded in the right lung, with the heart in close proximity, was found a second lobe of liver. The cœlom was filled by a third lobe of liver. Of the fifteen children whose sex was ascertainable nine were females, thus confirming one of Dr. M'Clintock's observations in his most interesting monograph on this affection. Of the mothers four were primiparæ.

MULTIPLE PREGNANCY—TWINS.

There were twenty cases of this variety during the year:—

Male and Female	7
Both Male	7
Both Female	3
Male and Mummified Fœtus	1
Male and Monster	1
Premature	1
Both Vertex	11
Vertex and Breech	3
Breech and Vertex	1
Brow and Vertex	1
Breech and Monster	1
Breech and Shoulder	1
Breech and Mummified Fœtus..	1



G. Carton

In one case hydramnios of the second sac occurred with succenturiate placenta. In one hydramnios of both sacs was observed, with much swelling of legs and belly, without the urine being albuminous. One case was complicated with concealed accidental hæmorrhage, and the first child presented occipito-posterior, and required instrumental delivery. Internal podalic version was necessary in one instance. One case was complicated by placenta prævia. In one a brow presentation was delivered by forceps. In one case the twins consisted of a well-formed male child, which presented by a foot and a soft lobular mass lying anterior to it, the exact nature of which could not at first be determined satisfactorily. By pushing it up and applying traction to the foot, delivery of a male living child was effected. Efforts at version failed for second child, as limbs could not be caught. Rotation of the mass on its long axis was effected by grasping it with the hand, and was followed by increased descent of the presenting portion, which was then seized with Auvard's cranioclast, and delivery completed. The monster consisted of a globular mass, having no differentiated head or neck, one end terminating as a blunt oval and the other presenting one rudimentary leg ending in a flail-like foot, having three toes. The other leg was represented by a mere stump. No trace of the upper extremities was observable. It is interesting to notice in this connection a very similar case lately recorded by Dr. Halliday Croom. In one case where the first presented by the foot, the second fœtus was lying transversely, and external cephalic version was performed.

TABLE No. VIII.—*Application of Forceps.*

Indications	—	Dead Children	Remarks
Delay in 2nd stage, with danger to mother and threatened death of fœtus - -	45	3	
Threatened eclampsia -	5	—	
Threatened rupture of uterus - -	1	—	
Pelvic contraction -	5	—	
Prolapse of funis -	4	2	
Accidental hæmorrhage	3	3	
Persistent occipito-posterior - - -	4	—	
Total, - -	67	8	

SUB-TABLE A.—*Showing Number of Pregnancy.*

I.-para -	49	VIII.-para -	2
II.-para -	5	IX.-para -	2
III.-para -	3	XI.-para -	3
IV.-para -	1	XII.-para -	1
		Total -	66

SUB-TABLE B.—*Showing Ages of Primiparæ.*

17–25 - -	17
26–30 - -	24
31–35 - -	6
36–40 - -	2
Total -	49

In many of the cases included under the heading "Delay in second stage with danger to mother or child," we had reason to know the second stage had been prolonged considerably beyond the customary time-limit of four hours. We have always adhered to the opinion that there are other and more important indications as to the proper time for terminating the labour artificially.

In two cases of twins, where both presented by the head, both children were delivered by forceps alive.

Physometra, with stinking, grumous discharge, was present at the time of admission in a patient—M. B., aged forty, 3-para—who was sent from one of our city institutions. Notwithstanding the external and internal uncleanliness of the patient and the presence in the bladder of four pints of fœtid urine, she convalesced so steadily that her discharge from the hospital took place on the ninth day of the puerperium.

In five cases where the occurrence of eclampsia seemed imminent it was deemed advisable to apply forceps as soon as it could be safely done, to prevent delay in labour, with its attendant risk of convulsions. In the case of threatened rupture of uterus, though the second stage had lasted only a short time, owing to very violent uterine action, Bundle's ring became easily palpable. Though the head was still above the brim, the delivery was effected without difficulty. In the five cases of contracted pelvis in this Table most satisfactory results were obtained, a living child being born in each instance. For prolapse of the cord forceps were applied on four occasions, and in two of these the child was born alive. In the three cases of accidental hæmorrhage where forceps were used only one child was born alive. During the year thirteen cases of persistent occipito-posterior were recorded, of which number only four needed forceps.

EPISIOTOMY.

Episiotomy was practised in eighteen cases, chiefly as an aid to forceps extraction, and in a few instances (where the delay appeared due to the rigidity of the perineum) to allow of the natural efforts completing delivery. In every case the results obtained were satisfactory. The single incision in the mesian line was invariably adopted.

INDUCTION OF PREMATURE LABOUR.

In five cases labour was induced, owing to pelvic contraction, by inserting in the uterine cavity bougies, generally three in number—their action being sometimes aided by placing laminaria tents in the cervical canal, and sometimes by using vaginal tampons. In some cases these measures were slow in provoking uterine action, even when aided by the administration of quinine and the use of the galvanic battery. Our observation plainly leads us to the conclusion that uterine action is more easily and certainly provoked in those patients who have on former occasions been successfully treated in this manner. In the case of R. M., aged thirty-eight, the patient's statements as to duration of pregnancy were entirely misleading, and some days after her admission to hospital liq. amnii and meconium began to escape from uterus, while the cervix barely admitted a finger-tip. Tents were introduced into cervix, and vaginal tampon used, but not till the third day was the cervix dilated sufficiently to admit of a foot being brought down. For many days after delivery the patient complained much of pelvic distress and soreness in the pubic region, and this was followed some days later by a copious discharge of pus through an opening in the vestibule. A probe passed into this opening came into contact with a considerable surface of bare bone in front of symphysis. After this escape of pus convalescence was speedy

and satisfactory. We have, with great regret, to record this year the only fatality consequent on the induction of premature labour which has occurred in the hospital during the past five years. The patient M. B., aged thirty-six, 5-para, was admitted from the country, where she had been delivered instrumentally on four occasions of still-born children. The uterus responded slowly and inefficiently to the stimuli employed, but finally expelled, unaided, a dead fœtus. The placenta was adherent, and required manual removal, as on each former occasion. A rise of temperature, while the pulse was still quiet, occurred on the third day, but as microscopically only the *Bacterium coli* could be discovered on curetting the uterus, great hopes were entertained that the elevation of temperature was not of serious import. Daily uterine douching and plugging with iodoform were, however, regularly carried out, but failed to avert a fatal termination, which occurred on the eleventh day.

OPHTHALMIA.

Four cases of ophthalmia occurred during the year. In all the attack was mild, and had entirely subsided before the infant left the hospital. The prophylaxis of this disease is still carried on, as heretofore, by the instillation of silver nitrate.

MENSTRUATION IN INFANTS.

A red, vaginal discharge, having the characters of menstrual fluid, was observed in two infants, beginning on the second day after birth, and lasting for four or five days. As in both cases the child's condition did not afford any indication for treatment, none was adopted.

ICTERUS.

The percentage of children showing this affection cor-

responds very much with that observed in former years, and the treatment adopted was also similar. One case deserves special mention on account of the intense discoloration of the skin, prostration and inability to take nourishment, and the presence of marked opisthotonos. The mother had previously borne only stillborn children, and though no distinct history of syphilis was obtainable, it was deemed advisable to administer mercury to the infant. During four days signs of life were at times discovered only with difficulty, but at length tardy improvement was observed, and though the discoloration of the skin persisted for many weeks, the child is now enjoying robust health.

ABORTION.

There were sixty-four cases of abortion treated in the hospital during the year, and in no case was there any serious rise of temperature or other complication. In nine cases the abortion was complete and needed no treatment. Severe hæmorrhage occurred in only five cases. In the management of those cases which required treatment the flushing curette was generally used.

ECLAMPSIA.

There were only two cases of this affection under treatment since our last Report:—

CASE I.—R. M., aged twenty-five, 2-para; at term; admitted November 19. Labour was uneventful and completed by natural efforts; infant, female, 7 lbs., alive. Some hours after delivery secondary hæmorrhage took place, but was easily controlled. Shortly afterwards patient had a fit, and was immediately given morphia, followed by a dose of croton oil. Subsequently only two fits occurred; and, with the exception of one rise of temperature, convalescence was most satisfactory. The urine contained a considerable amount of albumen.

CASE II.—J. K., aged twenty-one, 1-para; admitted April 16

from the Extern Maternity, one fit having occurred before she was seen. Half a grain of morphia was injected; a second fit followed in a short time. On admission the urine was found loaded with albumen; uterus hard and size of full term pregnancy, though it was believed that only the seventh month had been reached; fœtal parts not felt; cervix small and hard. While using the bed-pan five ounces of blood escaped from the vagina. There was no recurrence of the fits, and labour ended about ten hours later with the birth of a stillborn child. The placenta was found to be in great part detached—*ante-partum* clots lying on its surface and in its substance.

TABLE No. IX.—*Cases of Uterine Fibroid.*

Name	Age	Para	Presentation	Period of Pregnancy	Child	REMARKS
E. C.	36	II.	Breech	Term	A.	Cæsarean section : see Report
A. H.	27	V.	Vertex	"	A.	Fibroid at fundus
M. T.	22	I.	"	"	A.	Fibroid at left cornu
B. C.	20	I.	"	"	A.	Interstitial fibroids at fundus
M. O'T.	25	III.	"	"	A.	Fibroid—billiard ball at fundus
M. B.	39	III.	"	"	A.	Traces only of several fibroids which were plainly felt in two former pregnancies.

FACE PRESENTATION.

Amongst our intern maternity cases 5 presented by the face, and of these three were primiparæ. Of the remainder one was a 2-para, and the other a 5-para. In no case was the forceps used. In the 5-para hydramnios was pre-

sent, and the fœtus (6½ months) was anencephalic, with double talipes, equino-varus and dislocation of both knee-joints (see "Hydramnios"). Of the five cases the anencephalic fœtus was the only one stillborn.

BROW PRESENTATION.

Only once was a brow presentation observed, and it was the first of twins. Owing to delay in the second stage delivery by forceps was resorted to.

BREECH PRESENTATION.

During the year forty-three cases of presentation of the lower pole occurred, in thirty of which a living child was born. Of the thirteen stillborn children ten were macerated, one was associated with placenta prævia, and two were premature. In twenty-two of the thirty cases where a living child was born it was found necessary to assist the patient. In two cases arrest occurred. In one, where the delay took place at the outlet, delivery was effected without much difficulty by digital traction applied to the groin. In the other case, at the time of admission the membranes were ruptured and breech was engaged in pelvic cavity, the os being still only partially diluted. Morphia and, subsequently, a warm bath were used, and further interference postponed in the hope that the natural efforts would complete delivery. When longer delay appeared unsafe a fillet was passed round the thigh, and by its means traction was successfully exerted. Unfortunately, delivery was still further delayed by the chin becoming hitched on the symphysis, and the fœtal heart ceased before the completion of delivery. As might be expected, convalescence was slow, and only imperfect union of the lacerated perineum was secured. A high range of temperature (reaching on one day 106·2° F.) prevailed for several days, necessitating her retention in hospital for

three weeks, at the conclusion of which she was discharged in good health.

MORBIDITY.

Of the patients under the first heading—viz., 100·8° to 101·2° F.—twelve showed one rise of temperature during an otherwise normal puerperium, and no treatment was required. The remainder were mild cases, which yielded readily to treatment. One was a case of hydramnios, in which the membranes were adherent and removed by curette with some difficulty. One a case of accidental hæmorrhage; child stillborn; large clot expelled with placenta. One a forceps delivery, owing to prolonged second stage, extraction difficult; considerable laceration of perineum, and some *post-partum* hæmorrhage. In one the placenta was entirely adherent down to os internum (battledore shape), and removed manually. In one on seventh day the uterus was found enlarged and retroflexed, containing a quantity of blood clot. One was a patient, admitted from a large public institution in a horribly filthy condition; genitals excoriated by foul, stinking discharge; bladder containing four pints of foul urine; head on perineum; no fœtal heart heard; on delivery foul gas and fluid escaped in large quantity. Between 101·2° and 102·2° there were four cases included in sub-table, and requiring special treatment. Of the remainder, twenty-four only once during the puerperium showed an abnormal temperature. One was a case of twins, with hydramnios of the second ovum, with succenturiate placenta. In one case head and hand presented, and the latter was replaced. In one there was considerable accidental hæmorrhage, due to complete *ante-partum* detachment of placenta, which was expelled with a macerated fœtus. Mania developed in one case on the sixth day, two days after the temperature had fallen to normal. Another was

a marked case of eclampsia, which occurred subsequent to delivery; the urine was highly albuminous.

Between 102·2° and 104° F. seven cases are included in the sub-table, suffering respectively from syphilis, mania, bronchitis, mastitis, phthisis, and erythema. This latter affection in the case referred to assumed an unusually severe type, not only as regards temperature and pulse, but also in the degree to which the cutaneous circulation was affected, evidenced by the extensive exfoliation of the cuticle, which fell off in large flakes. The cases of lues were profoundly cachectic, and the condition of the external genitals, owing to the presence of numerous discharging sores, was calculated in a high degree to increase the perils of child-bed. In the case of mania, the mental disturbance began on the fifth day. Of the septic cases four left the hospital within nine days convalescent. One was a case of accidental hæmorrhage, and one a case of labour, prematurely induced on account of contracted pelvis. One was a case of macerated fœtus. Puerperal ulcer was observed in two cases, in one of which manual removal of placenta had been found necessary. In the remaining cases fragments of membrane or blood-clot undergoing decomposition were removed. All of these left the hospital convalescent within eleven days, excepting one, who was detained in hospital twenty-one days owing to general debility.

The case of phthisis, which ended fatally, had been confined to her bed for two months previous to admission, and traced the beginning of her illness to an attack of influenza. The physical signs of phthisis, which were well marked on admission, became accentuated after delivery. Death occurred on the seventh day of the puerperium.

Of those above 104° one was a case of Cæsarean section, and one a case of induced labour—both of which ended

fatally. One case, included in sub-table, developed influenza, and on the sixth day reached a temperature of 105°. She left the hospital convalescent within nine days. In one—a case of impacted breech in a primipara—labour was protracted, and delivery effected with great difficulty. Notwithstanding its immediate repair the healing of the perineal rent took place slowly, and was attended with much suppuration, the temperature on one occasion reaching as high as 106·2°. She left hospital on the twenty-first day, quite convalescent. In one—an unmarried woman—the convalescence was very slow, doubtless owing to the destitution in which she had lived for many weeks before her admission.

TABLE No. X.—*Morbidity.*

Temperature	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
100·8° to 101·2°	2	2	1	4	1	5	1	3	2	7	1	–	29
101·2° to 102·2°	2	2	4	3	5	3	4	1	2	4	4	1	35
102·2° to 104°	3	1	1	2	1	–	–	1	–	2	3	1	15
104°	–	2	1	1	–	–	–	–	1	–	1	1	7
Total monthly -	7	7	7	10	7	8	5	5	5	13	9	3	82
Percentage -	5	4·4	3·8	5·7	4·3	5·09	2·9	3·3	2·3	8	4·8	1·9	4·2

SPECIFIC CAUSE OF MORBIDITY OTHER THAN SEPSIS.[a]

Mastitis	- 4	Syphilis	- 2
Influenza	- 2	Erythema	- 2
Bronchitis	- 3	Not ascertained	- 12
Phthisis	- 1	Inflamed Piles	- 1
Pleurisy	- 1	Rheumatism	- 1
Mania	- 1		
		Total -	- 30

[a] These are included in the numbers in the table above.

TABLE No. XI.—*Prolapse of Funis.*

Name	Age	Date	Para	Period of Pregnancy	Presentation	Result to Child	Remarks
1. K. M.	23	Nov. 27	I.	Term	Vertex	D.	Forceps
2. E. M'G.	25	Dec. 25	II.	,,	,,	D.	Forceps; membranes ruptured before admission
3. H. A	35	Jan. 20	V.	6½ months	Footling	D.	Unaided, because cord was prolapsed and pulseless at time of admission
4. C. M.	30	,, 23	VII.	,,	Vertex	A.	Unaided
5. M. G.	27	Mar. 2	III.	Term	Hand & foot	A.	Traction.
6. M. C.	43	,, 7	XII.	,,	Vertex	A.	Forceps; cord pulseless at time of application
7. M. C.	23	,, 13	II.	,,	Breech	A.	Traction
8. A. F.	25	Apl. 4	II.	,,	Vertex	A.	Forceps
9. M. T.	23	May 18	IV.	6 months	Breech	D.	Fœtus macerated
10. H. R.	32	June 22	VI.	Term	Footlings	A.	Twins

Prolapse of funis being a complication of labour fraught with peril to the fœtus, it is a matter for much satisfaction that in the ten cases occurring in the hospital during the past year the fœtal mortality was so low. In the case of E. M'G. the fact of the membranes having ruptured before admission, at which time no doubt the prolapse occurred, left little possibility of successful treatment. An even more hopeless condition was present in the case of H. A. when she came under observation. In the case of M. C., though pulsation in the cord was no longer to be felt, rapid extraction with the forceps resulted in the birth of a living child. M. C. had hydramnios, and the escape of liquor amnii, which occurred during a vaginal examination, was attended with prolapse of the funis. The child of A. F. was in such a feeble condition at

birth that Schultzing was deemed necessary. For eight days subsequently marked opisthotonos was observable.

CÆSAREAN SECTION.

CASE.—E. C., aged thirty-six, 2-para; thin and of wretched aspect. Escape of liquor amnii had taken place some days before her admission on Dec. 18, and pains had followed, but did not continue. Examination showed that uterus reached to ensiform cartilage. Fœtal heart to left of umbilicus, above which a small fibroid could be felt. A large hard tumour occupied pelvis below promontory, leaving space to pass fingers to cervix which is above brim. Membranes felt over the presenting part, which floats. Head in right fundus. Tumour, though slightly movable, cannot be pushed up out of pelvis. Cæsarean Section, Dec. 19.—Abdomen and uterus opened, child removed. Large fibroid lifted out of pelvis; pedicle transfixed and tied. For several days after the operation, though pulse and temperature were normal, the patient's aspect showed no improvement; nourishment was badly taken, and the bowels were moved with much difficulty. Stitches were removed on eighth day, when a drop of pus was observed at lower angle of wound. Two days after a sudden rise of pulse and temperature occurred, and the patient rapidly sank. At the autopsy pus was found lying on front of uterus; a coil of intestine nearly gangrenous was adherent to back of uterus.

PUERPERAL APHASIA.

This rare and interesting condition was well illustrated in the case of R. F., aged thirty-three, 1-para, healthy appearance, who was admitted on the 9th and discharged on the 16th of April. Her history was as follows:—Her pregnancy had proceeded most favourably till the beginning of the 9th month, at which time her husband one day, on his return from work, found her in bed, and unable to speak anything but the word "yes." At the same time he observed large quantities of vomit on the floor. Her labour was uneventful, and during the puerperium the following observations were made:—

Nervous System.—Cranial Nerves.—1st. Olfactory sense apparently normal. 2nd. Optic discs normal; vision normal. 3rd, 4th, 6th. Ocular movements good and equal in all directions; pupils react to light and accommodation; no nystagmus. 2nd.

Facial movements normal. 5th. No sensory changes; taste normal. 8th. Hearing normal. 9th. Palate, nil; swallowing unimpaired. 10th, 11th and 12th. Nil.

Mental Condition.—Slight mental hebetude; receptive power slightly impaired; understands what is said to her, but after a slight interval; performs required actions after an interval. Writing power is fairly good; most of her letters well formed, but at the end of a word the letters are not so well formed as at the beginning. Memory is apparently unimpaired, as she is able to write down her age and where she lives, although when asked to speak the answers she was unable to do so. A few days after delivery she became able to say some words, as "yes," "no," "third," "I don't know;" but as often as not she would answer "yes" when she should have said "no," &c.

Motor Power is good in legs and arms; no paralysis detected; sensory nerves; no anæsthesia; no analgesia; thermal sense normal.

Reflexes.—All normal.

Sphincters.—Has had no incontinence of fæces or urine since admission, and the patient apparently always knew when there was need for the performance of either function.

Arteries.—No thickening or tortuosity detected.

Heart.—Sounds clear in all areas; apex beat normal in position.

Before going out the patient was able to repeat her prayers, &c., fairly correctly. The words she uses are correctly said; there is no slurring or misplacement of syllables. Patient could read written questions, and write the answers fairly correctly as regards spelling, but often wrong as regards sense.

Owing to the kind exertions of my friend Dr. Wilson, who recently resided some months in the hospital, I am in a position to supplement this most important history with the following details relative to the woman's present state of health:—

On examination, ten months after being in hospital, patient states that four months elapsed before she recovered comparative freedom of speech, but it has gradually improved. No defect is apparent in the cranial nerves.

Mental Condition.—Mental action is slower than normal.

1. She understands all that is said to her, in accordance with her education.

2. She has the power of recognising uses and relations of objects—*i.e.*, no aphasia.

3. She had the power to recall names of familiar objects seen, tasted, heard, or touched, or smelled, though she is unable to tell the names of unfamiliar objects, although she may know in her own mind what the name is, and, if pronounced by another, she at once recognises it, and can say if it is properly pronounced.

4. She can understand printed or written language.

5. Understanding of musical tones is somewhat deficient (perhaps normally so).

6. She has the power of voluntary speech, and there is no misplacement of words.

7. She can read aloud, but not so well as she could do before her illness.

8. Patient has lost the power of voluntary writing, except a few words, such as her name and address, and the name of her child. She is not able to voluntarily pen a letter, though she knows what she wishes to say (agraphia). Her husband does her correspondence.

9. Patient is quite able to copy correctly from writing or print. She gets her husband to write what she dictates to him, and then she can easily copy it, and write the letter.

10. She can write to dictation, only very short and simple sentences. Each word must be repeated separately before she can write it, and even then she spells words wrongly. When the correct spelling is shown she can at once detect her error. She is very slow and takes a long time to consider how to write a word after hearing it; but in copying from print there is very little delay.

11. Power of repeating words is limited to those with which she is familiar; long words she mispronounces, and knows that she does so; strange words she cannot pronounce at all until pronounced clearly and very often before her. No motor paralysis, no anæsthesia, or analgesia; thermal sense normal, as also reflexes.

Patient's Statement.—Says she is all right; has some difficulty in explaining uncommon occurrences; was unable to do any shopping for the first five months; she knew the names of the things she wanted, but could not say them; is slow in counting money; can manage all the household duties perfectly well. After any prolonged mental work she says that she feels confused,

and fails to understand things clearly. It was noticed that towards the end of the examination she confessed that she was tired thinking.

Another case was that of a patient admitted to the hospital three years ago, suffering at that time from impaired power of speech and locomotion, and I think it of interest to recall it now as affording several points of contrast with the two recently under observation. Mrs. S., aged thirty-five, when in the sixth month of her third pregnancy began to suffer from gradually increasing impairment and difficulty in speech and locomotion, for which she could assign no cause. These troubles increased, and were observable plainly at the time of her admission to hospital. Her labour ended in the birth of twins, unaided, and the convalescence was satisfactory, but not followed by any improvement in the points mentioned. She is now living in the country, and has given birth to another healthy infant. Her power of walking is so diminished that she is unable to leave her house, and her speech has the same halting character which first attracted my attention. Neither in the beginning of these troubles nor since has she suffered from headache or vomiting. Her articulation and choice of words are good, but she speaks, as she moves, with slowness and hesitancy.

The rarity of such cases is fully attested by the scanty notices of them in our medical literature, and even the small number here collected, both in their points of contrast and similarity, afford interesting evidence of varying phases and degrees of this affection.

Sir F. Bateman has recorded a very interesting case of a young woman who, during her second pregnancy, suffered from a gradually increasing loss of power in right arm and embarrassment of speech, which culminated in complete aphasia six days after delivery, which was natural and unattended by any unusual effort. The loss of speech was sudden, unattended by any loss of consciousness, and her appearance was as usual. Without developing any fresh symptoms, she became gradually weaker, and sank from exhaustion six weeks after her confinement.

In the case of A. O'T., aged thirty-four, admitted to hospital 7th December, 1900, we have another example. When about seven months pregnant, and suffering from much fatigue and anxiety caused by the illness of her children, she became suddenly affected with impairment of speech, some confusion of ideas, and lessened ability for her ordinary work. To these troubles were added pain in the occiput. At the time of her admission to hospital the aphasia alone was observable. The mental faculties and power of locomotion were not manifestly impaired. The labour and succeeding puerperium were uneventful, and when leaving the hospital, about nine days after delivery, scarcely any defect in speech remained. She has been recently seen by me (fifteen months after the beginning of illness), and complains of nothing except slight occasional headache, and a confused feeling in her head if worried or overworked. I could detect no impairment whatever in the power of speech, and she is able to perform all her domestic duties just as before illness.

PULMONARY EMBOLISM.

CASE—E. M., aged thirty-four, 1-para; admitted September 21; delivered same day; labour lasted 15 hours; the third stage 15 minutes. There was a tear of the vagina and a rent of the perineum, which was stitched. Her condition up to the 28th of September, when she was discharged, was quite normal. The involution of the uterus was good, and the healing of the lacerations quite satisfactory. While being driven home from the hospital, she complained of feeling faint and breathless, and she was taken to a tavern and given some whisky. As her condition did not improve, but rather grew worse, she was brought back to hospital, and readmitted about half an hour after her discharge. She was then cyanosed and gasping for breath, the pulse rapid and scarcely perceptible, and the extremities cold. The usual restorative measures were adopted, including the injection of strychnin and digitalin, the application of warmth to the extremities, &c. Examination of the chest showed a patch of dulness at the base of the right lung, and the other signs of pneumonia, and a little later there were distinct friction sounds audible over this area.

On the 2nd of October her temperature reached 103·4°, and it continued more or less elevated till October 12, when it was

again normal. Her generally weakened and emaciated condition necessitated her retention in hospital till October 29, when convalescence was again established.

EMPHYSEMA.

CASE—B. C., aged twenty-nine, 1-para, was admitted on July 25, in labour. Her aspect was healthy, and her general condition was satisfactory. Though neither the pains nor the expulsive efforts of the patient were violent, emphysema of the connective tissue of the neck was observed when she had been some time in the second stage. Owing to this circumstance and undue slowness of advance, assistance was given with the forceps. The day following delivery the emphysema had extended to the lateral walls of the chest, and was observable till the seventh day. At no time was there any redness of the skin. The patient enjoyed a normal convalescence.

Johnston and Sinclair record seven cases of this affection, but this is the first I have noticed during my Mastership.

MISCELLANEOUS.

In one case where forceps was used for delay in second stage a healthy living infant showed extensive peeling of epidermis on arms, just as in a macerated fœtus.

T. M., aged twenty-nine, 2-para; a healthy woman; had an unusually slow pulse—46–48 per minute.

J. C., aged twenty-eight, 5-para, suffers from sciatica in every confinement, pain coming on in left leg about an hour after delivery, and lasting for some days.

In the case of H. K., aged twenty-eight, 1-para, a fœtid odour was observed in uterine discharge at time of delivery, the infant being alive and healthy. The curette was used, and brought away some foul-smelling clots from uterus.

Table XII.—List of Cases Treated.

Disease	Total	Cured	Improved	Not Improved	Died	Remarks
Vulva—						
Vulvitis - -	2	2	–	–	–	
Bartholinian abscess -	6	6	–	–	–	
Epithelioma of labium -	–	–	–	1	–	Inoperable
Hæmatoma vulvæ -	1	1	–	–	–	
Kraurosis vulvæ -	1	1	–	–	–	
Eczema - -	1	1	–	–	–	
Perineum—						
Pendulous tumour -	1	1	–	–	–	
Lacerations, simple -	37	37	–	–	–	
" complete -	3	3	–	–	–	
Rectum—						
Recto-vaginal fistula -	1	1	–	–	–	
Hæmorrhoids - -	1	1	–	–	–	
Fissure - - -	2	2	–	–	–	
Prolapse - -	2	–	2	–	–	
Imperforate Anus -	1	1	–	–	–	
Urethra and Bladder—						
Cystitis - - -	3	1	2	–	–	
Caruncle - -	5	5	–	–	–	
Carcinoma - -	1	–	1	–	–	
Ulceration, syphilitic -	1	–	1	–	–	
Urethritis - -	1	1	–	–	–	
Ulceration of bladder -	1	1	–	–	–	
Vagina—						
Cicatrix and stenosis -	1	1	–	–	–	
Cysts - - -	2	2	–	–	–	
Cystocele - -	9	8	1	–	–	

Table XII.—List of Cases Treated.—*con.*

Disease	Total	Cured	Improved	Not Improved	Died	Remarks
Vagina—*con.*						
Rectocele	5	5	–	–	–	
Fistula, vesico-vaginal	3	2	–	1	–	
Vaginitis	17	17	–	–	–	
Epithelioma	2	–	–	2	–	
Cervix—						
Carcinoma	9	–	4	*5	–	*Inoperable
Erosion	18	18	–	–	–	
Hypertrophy	4	3	–	1	–	
Laceration	26	26	–	–	–	
Cysts of	1	1	–	–	–	
Polypus of	3	3	–	–	–	
Corpus Uteri—						
Abortion, Incomplete	23	23	–	–	–	
Sarcoma	1	–	–	–	1	
Carcinoma	2	–	1	–	1	
Endometritis	85	70	15	–	–	
Fibromyoma	24	9	13	†1	1	†Associated with malignant disease of colon
Anteflexion, acute	21	3	18	–	–	
Pregnancy	11	–	–	–	–	
Polypus	4	3	–	–	1	Polypus sloughing; patient profoundly septic on admission
Procidentia	3	2	1	–	–	
Prolapse	2	2	–	–	–	
Adherent retroversion	17	–	17	–	–	
Retroversion	22	8	14	–	–	Pessary used in 9 cases
Retroflexion	15	7	8	–	–	Pessary used in 3 cases
„ with pregnancy	2	2	–	–	–	
Subinvolution	36	36	–	–	–	
Infantile uterus	1	–	–	–	–	

Table XII.—List of Cases Treated.—*con.*

Disease	Total	Cured	Improved	Not Improved	Died	Remarks
Fallopian Tubes—						
Pyosalpinx - -	4	2	1	–	*1	*Dying of hectic on admission
Salpingitis - -	9	4	5	–	–	
Tubal pregnancy -	2	2	–	–	–	
Hydrosalpinx - -	2	2	–	–	–	
Hæmatosalpinx -	1	1	–	–	–	
Perimetritis - -	14	2	12	–	–	
Parametritis - -	19	1	18	–	–	
Ovaries—						
Cysts - - -	14	13	–	–	1	Gangrene of stump ducts; pyosalpinx
Cystic - - -	25	2	†23	–	–	†Not calling for removal
Dermoid - -	4	4	–	–	–	
Ovaritis - -	3	–	3	–	-	
Prolapse - -	33	–	–	–	–	In four cases both; in twelve cases right only
Parovarian cyst -	1	1	–	–	–	
Carcinoma - -	1	1	–	–	–	Primary disease of ovary
Hæmatoma - -	1	1	–	–	--	
Abdomen—						
Carcinoma - -	1	–	-	-	–	
Peritonitis - -	3	3	–	–	–	
Miscellaneous—						
Ascites - - -	1	–	1	–	–	
Melancholia - -	1	1	–	–	–	
Diabetes - -	1	–	–	-	1	
Mastitis - -	1	1	–	–	–	
Caries and vaginal sinus	3	1	2	–	-	
Pseudocyesis - -	2	2	–	–	–	
Pernicious anæmia -	1	1	–	–	–	
Epilepsy - -	1	–	–	–	–	
Cancer of liver - -	1	–	–	–	1	
Sapræmia - -	3	3	–	–	–	

VULVA, VAGINA AND PERINEUM.

Amongst our patients was one in whom the vulva presented at one point the chief signs of that rare affection termed kraurosis. During her stay in hospital it nearly disappeared. A pendulous tumour of the perineum was met with and removed. I have in former Reports made some allusion to these growths and their greater frequency in females. I have not before met one in this position. In this Report, as also in last year's, we have record of a case in which, on the left side of the vagina, a small sinus was detected leading to a point on the ischial spine, where the bone was rough and evidently stripped of periosteum. The occasional douching of the sinus with an antiseptic lotion, and the administration of the syrup of iodide of iron, soon effected a cure. This trouble originated in the first confinement, which had taken place in the County Longford a few weeks previously. In our last year's Report I described a large abdominal cyst originating apparently in or near the left kidney. It was freely opened, the edges stitched to the opening in the parietes, and the cavity packed with gauze—a treatment which was followed by speedy recovery. At the time Dr. Earl wrote of this:—"If this is a renal tumour it is a comparatively rare condition known as papilliferous cyst adenoma of kidney; and if so it is likely to behave as a malignant growth, though there is no cancerous tissue present." His forecast, I regret to say, has been remarkably fulfilled. The poor woman sought admission to the hospital about ten months afterwards, and the local and general conditions then present made further interference hopeless.

TABLE XIII.—OPERATIONS.

Colporrhaphy—Anterior - - - - -	13
„ Posterior - - - - -	
Colpoperineorrhaphy - - - - - - -	3
Hæmorrhoids - - - - - - -	1
Imperforate Anus - - - - - - -	1
Epithelioma of Cervix, Cauterisation of - - -	7
Fistula, Vesico-vaginal - - - - - - -	3
Posterior Division of Cervix (Dudley) - - -	3
Removal of Caruncle - - - - - - -	5
„ Cervical Polypi - - - - - -	3
„ Cysts of Cervix - - - - - -	1
Perineorrhaphy (Lawson Tait) - - - - -	40
Trachelorrhaphy—	
Emmet's - - - - - - -	22
Schröder's - - - - - - -	6
Sanger's - - - - - - -	1
Reposition of Inverted Uterus - - - - -	1
Ventral Cœliotomy—	
Exploratory - - - - - - -	8
Ovariotomy - - - - - - -	16
Panhysterectomy - - - - - -	11
Salpingo-oöphorectomy - - - - -	16
Supra-vaginal Hysterectomy - - - - -	—
Tubal Pregnancy - - - - -	2
Myomectomy - - - - - - -	2
Salpingostomy - - - - - - -	1

TABLE XIV.—PANHYSTERECTOMY (FOR FIBROIDS).

No.	Name	Age	—	DISEASE	Result	REMARKS
1	E. E.	27	Married	Fibroid uterus .	Recovered	Severe floodings had rendered patient very anæmic.
2	M. M.	45	Single	Large fibroid uterus .	Recovered	At 40 years of age tumour so small that no interference was deemed necessary.
3	C. M'A.	40	Single	Very large fibroid, weighing 16¼ lbs., reaching down nearly to sternum	Recovered	
4	E. D.	49	Single	Fibroid uterus reaching to umbilicus	Recovered	Uterus so twisted that the right appendages lay anteriorly in mesian line. Right ovary not removed.
5	D. C.	38	—	Fibroid uterus .	Recovered	Uterus reaches 2½ inches above umbilicus ; one ovary left ; large nodule in Douglas's space.
6	S. G.	41	Single	Interstitial fibroid .	Recovered	One ovary left. Tumour reaches above umbilicus.
7	J. C.	37	Married	Uterine fibroids .	Recovered	Three sub-peritoneal fibroids.
8	A. K.	27	Married	Fibro-myoma .	Recovered	Tumour reaches 3 inches above umbilicus.
9	M. W.	39	Single	Fibroid uterus .	Recovered	Tumour reaches to umbilicus ; large nodule in Douglas's space.
10	J. M.	70	Single	Large nodular fibroid reaching to ensiform cartilage	Died	Tumour was extensively calcified ; closely invested at many points by adherent omentum ; uterine vessels small, and found with much difficulty. Calcified corpus luteum in left ovary.

In my cases of abdominal hysterectomy for uterine fibroids only one fatality occurred, and this was due to shock. The patient was over seventy years of age, the tumour extensively calcified, and widely adherent to omentum and intestines. The left ovary contained what, from its colour, I judged to be a calcified corpus laterum. The forceps to which I have alluded in a former Report was, in many instances, of assistance in opening the vaginal fornices.

ABDOMINAL HYSTERECTOMY FOR MALIGNANT DISEASE OF THE UTERUS.

CASE.—E. B., aged thirty-six, unmarried. This patient was admitted to hospital in October, 1900, when the cervix was found enormously dilated by a firm and apparently benign uterine polypus, the pedicle of which was attached inside the os internum. The surface of the polypus, visible through the slightly dilated os uteri, was in a sloughing condition. Two lateral incisions in wall of cervical cavity made it possible to remove the growth by morcellement; it was then observed that the uterine wall was very thick in places, and its inner surface very uneven. She convalesced satisfactorily and went home, but returned in about three months, when the uterus was found much enlarged, very fixed, and discharging blood and pus in quantity. As the conditions present rendered vaginal hysterectomy impracticable, I attempted to remove the diseased organ by the abdominal route, but the patient succumbed to the shock attendant on a very protracted and difficult operation, in the course of which I had the misfortune to injure one of the ureters.

MYOMECTOMY.

M. R., aged forty-nine, single. Large pedunculated fibroid. Recovered.

S. N., aged thirty-five. Small pedunculated fibroid. Recovered.

The case of M. R. was of much interest, because of the large size the tumour had attained while its existence was still unknown to the patient; and still more because of the degenerative changes which it shows on section. A few weeks before her admission she was suddenly seized with severe abdominal pain, which proved

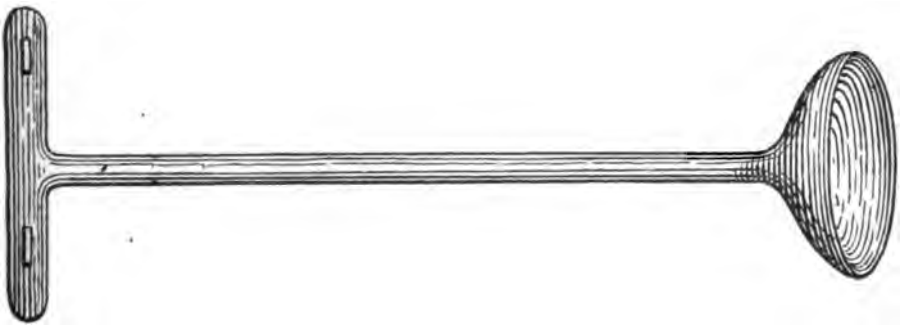
to be the beginning of an attack of peritonitis, lasting for several weeks, and greatly endangering the patient's life. The physician in attendance in the course of examining and treating the case detected the growth, and sent her to me for its removal. At the operation, very numerous omental and intestinal adhesions were encountered, and on separating them the surface of the tumour was observed to be of a greyish green colour, much more suggestive of an ovarian than a uterine origin. On section the tissue of the growth is observed to be of a dark red colour, traversed by numerous cavernous spaces, due to changes in the blood-vessels, and containing blood much altered in character. This form of degeneration in uterine fibroids has hitherto been very rarely observed or described; and thanks to the skill and artistic ability of my Chief Assistant, Dr. Paul Carton, I am in possession of an admirable drawing which reproduces with rare felicity the above-described structural changes. My patient made an excellent recovery.

INVERSION OF UTERUS.

This case is interesting, both on account of the circumstances attending its occurrence and its happy termination:—

CASE.—M. Mc., aged twenty-seven, was delivered of her second child on April 18, 1901, and as hæmorrhage had followed the first confinement, it was deemed advisable by the physician in attendance to allow the third stage ample time. After waiting two hours it was found necessary to remove the placenta manually, as it proved to be universally adherent. All went well for a week, when the patient left her bed to undertake household duties, and was attacked with hæmorrhage, so severe as to endanger her life. Her physician on his arrival found the uterus inverted, and succeeded, as he thought, in replacing it, but the bleeding, though greatly lessened, returned from time to time for some weeks. When strength was somewhat restored she left home for a short time, and on her return was examined and believed to be quite well. Soon afterwards, while making some prolonged exertion in her house, severe bleeding again occurred, and she was sent to the Rotunda. On admission, four months after delivery, her blanched face and general prostration were such as to cause me grave

anxiety, increased by the fact that slight bleeding was still occurring. An examination easily established the diagnosis of complete inversion of the uterus, but I determined to postpone any attempt at reposition till her general condition was more favourable. While waiting for this much-to-be-desired improvement I thought over the various devices, mechanical and surgical, which have in several reported instances been found of use. Finally, I devised the very simple apparatus which is before you, and was constructed for me by our chief artificer, Mr. Smith. As I was by no means sanguine as to the possibility of immediate reposition, the precaution was adopted of having apertures placed in the cross-piece at end of stem, with the view of applying continuous pressure by means of elastic bands. When the patient was anæsthetised the cervix was steadied with four bullet forceps, and, to our extreme satisfaction, steady pressure with the repositor for a few minutes effected reposition. A speedy convalescence followed, and the patient returned home in less than a fortnight.



When inversion of the uterus has become chronic its reduction is rarely effected without pressure applied, as in most of the recorded cases, for many hours consecutively. And I attribute our success in this instance partly to the suitability of the appliance used, but chiefly to the steady counter-traction exercised by means of the bullet forceps.

Our cases of ovariotomies, though small, afford illustrations of the accidents and complications which may attend the growth of ovarian tumours.

TABLE XV.—OVARIOTOMY.

No.	Name	Age	—	DISEASE	Result	REMARKS
1	M. H.	37	Married	Dermoid R. .	Recovered	Cyst firmly attached to rectum; bladder adherent to bowel, arching over uterus, and concealing it from view.
2	M. F.	22	Single	Primary carcinoma of right ovary	Recovered	Tumour reaching into flanks, and nearly to ensiform cartilage. Recurrence in a short time.
3	M. K.	30	Married	Dermoid size of cocoa-nut	Recovered	Patient three months pregnant.
4	E. F.	41	Widow	R. & L. .	Recovered	One papillomatous.
5	M. S.	26	Married	Dermoid R. .	Recovered	
6	M. S.	26	—	R. & L.; one=fœtal head; the other smaller	Recovered	
7	B. G.	31	—	R. & L. Both small	Recovered	
8	B. M'A.	60	—	R. small cyst, L. large	Recovered	Cyst, which had ruptured previous to operation; cœlom contained large quantity of fluid freely mixed with fluid and clotted blood; intestines adherent to cyst and much congested.
9	E. L.	60	—	Large cyst .	Recovered	Shortly after admission patient became collapsed, and immediate operation necessary; cyst found ruptured; very firm adhesions to parietes.
10	R. L.	27	—	Large cyst .	Recovered	
11	M. K.	44	—	Dermoid .	Recovered	

12	M. C.	36	—	Large cyst .	—	Cyst completely filling cœlom; on tying and dividing the pedicle pus was observed oozing from the severed tube which formed part of it; this was carefully wiped and cauterised with carbolic acid, and peritoneum stitched over it. On the eighth day the local and general conditions were such that I opened the belly and found the stump and adjacent tissues in a gangrenous condition. Death soon after.
13	C. T.	56	—	Large cyst and two smaller ones. Fibroid U.	Recovered	
14	S. P.	38	—	Ovarian cyst & double hydrosalpinx	Recovered	
15	M. C.	48	Married	Left ovarian cyst .	Recovered	
16	S. N.	35	Single	Left ovarian cyst; vessels in pedicle thrombosed	Recovered	

CASE 9.—E. L., aged sixty, was very emaciated. The sudden occurrence of violent vomiting and other indications of collapse led me to diagnose rupture of the cyst; this was confirmed at the time of operation, carried out immediately afterwards. Very firm adhesions prevented the entire separation of the cyst from the parietes at several points. But convalescence was easy and rapid, notwithstanding troublesome vomiting for several days.

CASE 8.—Bridget M'A., aged sixty; presented evidence of free peritoneal fluid, with an ill-defined cystic tumour, which, at the time of operation, was found to be torn and collapsed at several points. Considerable bleeding into the peritoneal cavity had occurred, but unattended with serious constitutional symptoms.

CASE 13.—C. T., aged fifty-six, had been under my care many years ago for the treatment of menorrhagia, due to uterine fibroids; this had been controlled by injections of ergot. At the time of her admission such general distention of the belly with fluid was present that I was not certain of the presence of an ovarian cyst. At the operation three distinct cysts were removed which Dr. Earl asserts were all three ovarian.

Our only fatality was in the case of M. C., where a pustule and ovarian cyst co-existed, and I hoped that the precautions taken to prevent soiling of the peritoneum would have been effectual.

SALPINGO-OÖPHORECTOMY.

In this table will be found cases illustrating many of the diseased conditions induced by inflammation of the appendages, and in only one, a patient of very phthisical aspect, was the convalescence at all tedious. This was due to parametritis occurring in the neighbourhood of the stump, and subsequently suppurating and discharging per vaginam.

CASE 16.—R. B., aged twenty-two, presents so many points of interest that I narrate it in full. While making some unusual exertion in her household duties, severe abdominal pain was experienced; soon after violent retching and purging occurred

and lasted for some days before her admission to hospital. Vaginal examination shows a large cystic mass with fluid contents, occupying Douglas's space, low in pelvis and reaching above nearly to umbilicus, not movable and adherent to uterus, which lies in front. The sound passes 3½ inches. Though I hoped to drain the tumour by the vagina, I followed the plan practised in some similar cases and advocated in a former Report—viz., to perform an exploratory laparotomy, and then, with the additional guidance thus obtained, tap the tumour through the vaginal wall. On opening the cœlom, the omentum, thick and fat, was observed smoothly spread over the bowels, completely concealing them from view, and adherent to a deep red globular mass in uterine region; no appendages were visible; one round ligament could be traced, showing the tumour in view consisted of the uterus, incorporated with a swelling in Douglas's space. While endeavouring to ascertain its relations, pus escaped freely from a point at the left side of the swelling. Forthwith I proceeded to incise the posterior vaginal wall, enlarged the opening with a forceps, then washed out and packed the cavity with iodoform gauze. Four ligatures were passed through the edges of the opening in the vagina, securing the cyst wall to it. The cœlom was well flushed and a Mickulicz' bag inserted in wound and removed two days later. Some days later free bleeding occurred in the track of one of the vaginal stitches and was only stopped by placing two stitches on the bleeding point. The patient made an excellent recovery.

CASE 7.—The patient L. G. became jaundiced four days after operation, but there was no constitutional disturbance, nor delay in the convalescence.

CASE 15.—The patient from whom I removed the healthy appendages, had become blanched by repeated hæmorrhages from a fibroid uterus, presenting only slight enlargement. Thorough curetting on two occasions, followed by suitable treatment, had proved unavailing. I am happy to add that since her return to Texas, where she resides, her health has been excellent. Similar good results have been secured in all the cases of this kind so treated by me. In more than one instance where the ovary appeared much disorganised by cysts of various sizes, the larger ones have been incised, the contents scraped out, and the opening closed by silk or catgut.

TABLE XVI.—SALPINGO-OÖPHORECTOMY.

No.	Name	Age	—	Disease	Operation	Result	REMARKS
1	E. R.	33	Married	Hæmatoma of ovary and salpingitis	—	Recovered	
2	C. D.	30	Married	Hæmatoma of ovary and salpingitis	—	Recovered	Pelvis contained large quantity of clots; scarcely any trace of ovary remained.
3	S. R.	30	Married	Tubo-ovarian abscess	—	Recovered	
4	A. B.	38	Married	Tubo-ovarian abscess	Left	Recovered	Gauze drain used.
5	M. C.	48	Married	Ovarian cyst and parametritis	Left	Recovered	
6	E. C.	27	Married	Tubo-ovarian abscess	Right	Recovered	
7	L. G.	26	Married	Hæmatoma of ovary	Left	Recovered	
8	K. Q.	21	Married	Double pyosalpinx -	Double	Recovered	
9	M.M'D.	21	Married	Hydrosalpinx -	Right	Recovered	
10	K. K.	36	Married	Hydrosalpinx -	Right	Recovered	
11	M. M.	21	Married	Pyo salpinx -	Right	Recovered	Salpingectomy and resection of ovaries.
12	A. Q.	30	Married	—	—	—	
13	K. H.	30	Married	Hæmatosalpinx -	R. & L.	Recovered	Salpingectomy.
14	B. G.	23	Married	Pyosalpinx and ovarian cyst	Right	Recovered	Left tube thickened; ovary cystic; it was resected. Tedious convalescence, owing to parametritis.
15	Sister V.	45	—	Fibroid uterus -	R. & L.	Recovered	Appendages removed because of repeated bleedings Perfect result.
16	R. B.	22	Married	Pyosalpinx (large) -	—	Recovered	Vaginal drainage. See p. 280.

TUBAL PREGNANCY.

B. M., aged thirty, 2-para. Ten years after birth of second child amenorrhœa for two months occurred, followed by bleeding for five weeks, during which time vomiting and faintness were frequently experienced. At the time of admission to hospital (July 29, 1901), an ill-defined tumour, size of fist, was felt in Douglas's space as well as some thickening of the left tube. On opening the cœlom clots in considerable quantity were lifted out of pelvis; left tube distended and adherent in Douglas's space. It was tied and removed. Peritoneum flushed and continuous peritoneal suture of silk used in addition to the ordinary interrupted sutures. Recovery.

M. J. O'K., aged thirty, 1-para, admitted August 13, 1901, with a history of hæmorrhage lasting for four weeks, preceded by amenorrhœa for six weeks. By vaginal examination it was possible to feel an oval swelling, lying immediately behind symphysis and in close relation to the cervix. A larger, firmer body lay posteriorly, which further examination showed to be the uterus. Operation, August 23. Incision showed an oblong swelling, closely adherent to bladder in front, and uterus, omentum, and intestines behind. Its removal was effected without difficulty and abdomen closed as in previous case. Recovery.

MELANCHOLIA.

One patient suffering from this distressing condition was under observation during the year, and her history shows to what a remarkable degree local treatment sometimes avails in ameliorating mental derangement.

CASE.—E. M., aged thirty-six, single, had on more than one occasion consulted me for slight pelvic distress, chiefly due to cervical catarrh and vaginitis, which were attended by insomnia and mental depression. For several months before her admission these latter troubles had become so much aggravated as to fully warrant the diagnosis of pronounced melancholia. Discussion of her ailments with sympathetic friends had led her to the conclusion that a cure was only to be effected by the removal of the uterine appendages, and this she was quite prepared to undergo. Under an anæsthetic one ovary was found cystic and slightly

enlarged, the other normal, and the uterine cavity somewhat elongated. Suitable treatment for these conditions was followed by surprising improvement in her general health; sleep and cheerfulness returned; and she left the hospital in better health than she had enjoyed for years.

MISCELLANEOUS.

Amongst these cases the following may be noted in brief detail:—

CASE 6.—M. G. Four years ago she suffered from severe abdominal pain lasting for a fortnight, attended with foul vaginal discharge; and about this time an abdominal tumour was detected. Two weeks before admission she was attacked with severe pain in groin, attended by vomiting and followed by increasing distention of belly. When she came under our observation a firm tumour, rising above umbilicus, was detected, attended with general distention and extreme tenderness. Per vaginam the uterus was found lifted out of pelvis, and the left vaginal fornix occupied by a smooth tumour. Her aspect, pulse and temperature pointed to a hopeless condition, but I determined on an exploratory incision, which revealed the presence of an enormous quantity of fœtid pus free in the peritoneal cavity, and a malignant growth on the left side lifting up peritoneum, and in part passing behind and becoming incorporated with sigmoid flexure. In trying to separate this mass from its bed, the iliac vessels, psoas muscle, pelvic nerves and ureter were exposed. It is difficult to understand how life was prolonged for two weeks in the presence of conditions disclosed at the time of operation.

CASE 2.—The patient A. J. was of delicate aspect, had been, from childhood, frequently ailing, and many months before her admission had suffered from pyosalpinx, discharging into the bowel. As her condition after rest in bed and careful nursing showed no improvement, an exploratory operation was performed unavailingly. At the *post mortem* examination an abscess was found communicating with the rectum and containing some ounces of very fœtid pus.

TABLE XVII.—MISCELLANEOUS.

No.	Name	Age	—	DISEASE OR CONDITION	Result	REMARKS
1	F. J.	49	Single	Small fibroid uterus .	Recovered	Tumour grew from fundus; uterus deeply set in pelvis, and enveloped in adhesions. Entire relief from pain when discharged.
2	A. J.	24	Single	Tubo-ovarian abscess and pyosalpinx opening into bowel	Died	Patient was dying of hectic at the time of exploratory operation. It was not found possible to remove anything owing to adhesions.
3	C. D.	53	Married	Carcinoma of bowel and ascites	Died	Exploration only.
4	L. M.	30	Married	" "	Recovered	Exploration only.
5	R. L.	40	Married	Chronic peritonitis .	Recovered	Exploration only.
6	M. G.	44	Married	Purulent peritonitis and malignant tumour	Died	Exploration only.
7	L. J. D.	45	Married	Peritoneal cysts and salpingitis	Recovered	Exploration only, followed by good health.
8	K. S.	29	Married	Tubercular peritonitis .	Recovered	Excellent results.

DR. MACAN congratulated Dr. Purefoy on the satisfactory nature of the Report, comparatively far more in the putting together of it than in the facts. There were some few points in the Report which he thought called for observation. In Table III. he found that of 286 abortions it was thought necessary to curette 200. This is a very large proportion—two out of three cases. What were the indications that justified so many operations? To-day the danger from drugging is almost *nil*, thanks to our antiseptic measures. Curetting is attended with danger in the puerperium; he has seen the principal assistant in the Munich clinic perforate the uterus at the very beginning of the operation. The application of the forceps in the extern maternity has the low proportion of 1 in 57·2 cases. Personal considerations enter so largely into the greater or less proportion of cases in which they should be used that we cannot say much on the question. But he cannot understand why it was necessary to have such a high proportion as 1 in 24·5 of the forceps for cases in the house, where the patient was throughout under observation, and the forceps could, if necessary, be applied at any moment considered advisable. In his own practice he now seldom applies the forceps, and he thinks the less they are used the better. Table V., cases of contracted pelvis, records the case of A. M., with an antero-posterior measurement of 7·5, who, unaided, gave birth to a living child, 8½ lbs. in weight. This case is remarkable, for the measurement is below that which is considered necessary for the birth of a living child. Equally interesting is the case of M. H., whose child weighed 8¼ lbs. In the treatment of accidental hæmorrhage he finds that the oxytoxic properties of quinine are believed in; as for himself, he never found evidences of the alkaloid possessing such properties, and he thinks that five grains of it would not have much effect. He would, however, like to hear from Dr. Purefoy how the drug was used by him. The phrase inconsiderable bleeding as applied to *post-partum hæmorrhage* seems strange; he would not feel inclined to call an "inconsiderable" bleeding *post-partum hæmorrhage*. The frequency with which a red discharge is found to follow retroflexion of the uterus should be impressed on students. Too often it is thought that as the uterus is pressed down behind the pubes, there is a firm contraction, when the truth is that the uterus has become retroflexed and a red discharge follows. In the case of an anencephalic

child exhibiting congenital luxation of both knee-joints, he regrets that Dr. Purefoy did not more fully describe the luxation, and he would like to get some particulars of the case. Mr. M'Clintock's case was characterised by the limbs flexing anteriorly at the knee-joint. The sub-division of forceps cases is not wholly satisfactory. In cases of episiotomy he prefers the lateral incision, as if it does not give all the space necessary one can incise the opposite side; it gives better results than the mesial incision, and its after results are better. *Icterus neonatorum* is much more common than is generally supposed; fully 80 per cent. of children suffer from it, and as a rule they get well without any treatment at all. Withal, students should be told to be careful in their prognosis, for one of his cases died of it. He looks on the bad cases as due to malformation, and if for that reason alone they should not be too sure that every case will turn out well. He thinks that there is little use in setting up a morbidity table for oneself if with such a table one cannot make a comparison with other institutions. The Report, however, showed extremely good results; in such cases a morbidity of 12 to 20 per cent. is considered a very good return, The case of Cæsarean section is rather obscurely reported. "Large fibroid lifted out of pelvis; pedicle transfixed and tied." Was it the pedicle of the tumour or of the uterus? If of the latter, the operation performed was that of Porro. To him there is no evidence of any connection between the case of aphasia reported and the puerperal state. Lots of cases of aphasia occur, and they all get well; there is no necessary connection between the confinement and the recovery of the speech. If one can show a case in which during several consecutive pregnancies aphasia occurred and disappeared on the termination of labour in each case, it will be seen that some correlation exists, not otherwise. Of the case of pulmonary embolism we read: "Examination of the chest showed a patch of dulness at the base of the right lung, and the other signs of pneumonia." But we are not told when the examination was made—before she left the house or after her return.

Dr. Jellett thought as he read the Report that somebody had worked very hard at it for twenty-four hours in collecting a great mass of materials, and then had neglected to spend a couple of hours in putting them into shape. At the very beginning he finds that the mortality table was forgotten; while in the section on accidental hæmorrhage it is recorded that two mothers died, but there are no particulars given of them in the list of interesting

cases. In the case of rupture of the uterus and vagina he considered that the accident was due to the plugging, the tampon being allowed to remain after the uterine contraction had commenced. He considered that the tampon should be removed when the uterus pains are well begun. Quite recently a student of the Rotunda told him that the plug was allowed to remain in position until expelled with the child. The measurements as given in the table "contracted pelvis" appear to show that they get round pelves in the Rotunda, and he cannot help thinking that the measurements must be wrongly taken. Menstruation appears to him to be a misnomer for the red discharge that occurs in newly-born female children. It is an isolated hæmorrhage, not a menstrual flow. He congratulated Dr. Purefoy on a low mortality equal to any since the hospital was founded.

Dr. W. J. Smyly congratulated Dr. Purefoy on his excellent Report, and the very low mortality of three out of 1,600 cases. He does not approve of curetting after abortions—it is not good practice. But a good deal depends on the kind of curette used—sharp, semi-sharp, dull. In all abortion cases where curetting is called for, he uses the dull instrument. The uterus during the puerperium is abnormally soft, especially its mucous lining; if you curette it all thoroughly there is the risk of perforating the wall, and if you curette imperfectly you leave septic matter close to a raw surface, a nidus of infection. In no case should a sharp curette be used. He recommends postponing the operation for six weeks. At the end of that time, the risks attendant on the operation are considerably lessened, and you then can recognise the firm muscle tissue under the instrument as you use it. In reference to the use of the forceps we read that the indications for their use are (1) danger to the mother, (2) danger to the child. But how are you to tell? They sometimes have to be used to save the mother unnecessary pain. He cannot see that all the women on whom they were used in the house were in danger. He, however, thinks that we differ more in expression concerning them than in practice. The taking of the pelvic measurements is not always easy of performance. Skutsch's pelvimeter, which he prefers, is an awkward instrument and very inconvenient to use. He would like to learn from Dr. Purefoy something more of his case of transverse narrowing at the outlet, which is a condition of great interest. In cases of narrowing of the pelvis, he was formerly inclined to practise version, but latterly he allows the head to mould; he would like

to hear what the present teaching is. Thirty-seven cases of accidental hæmorrhages seem an extraordinary number for one year; they formerly looked on concealed hæmorrhage as almost fatal; here it seems to signify little. He looks on the plug as dangerous if left in the vagina long after labour has commenced. But he cannot agree that in the reported case the plug occasioned the tear. The injury may have been due to one of three things: (1) plugging the vagina; (2) pressure of the head on the cervix; (3) pulling up of the vagina. *Ophthalmia neonatorum* was one of the troubles he prided himself, while Master of the Rotunda, on keeping the house clear of, and yet in that Section on one occasion when some ophthalmic surgeons were present he heard that their hospital clinics were crowded with cases of the disease in children who came from the Rotunda Hospital.

Dr. Purefoy begged to thank the members of the Section for the reception they had given his Report, and particularly those who pointed out its defects. Dr. Macan had waxed eloquent on the unwisdom of curetting, but he did not agree with him at all. He had had a very large experience both in the Coombe and in the Rotunda, and he was of opinion that the sooner you curetted and removed all septic matter from the womb the better. Of the wisdom of this procedure he was quite satisfied. The dangers of the operation were known to all. As to the question—Should it be necessary to curette two out of every three cases? He would answer—Curetting is expedient, even if not necessary. He did not mention that he used a blunt curette, for he took it for granted that the members were too familiar with the fact that a sharp curette should not be used in a parturient womb. Forceps were used under the indications plainly pointed out; they acted on the nature of the case and the condition of the patient. The state of the patient, not the length of time, regulated their conduct. Pelvic measurements were carefully taken and accurately noted, but all who take such measurements must be conscious of the difficulties of such work. The transverse narrowing of the outlet was due to approximation of the tubera ischii; he regrets that the patient was allowed to leave before measurements were taken. The oxytoxic properties of quinine are known and advantage taken of them to stimulate uterine action. He finds five-grain doses of the alkaloid every four or six hours an excellent oxytoxic remedy. *Post-partum* hæmorrhage is a relative

quantity; it may be severe or slight, and a small discharge is quite as much entitled to the designation *post-partum* as the most profuse. The lateral and bilateral incisions in episiotomy advocated by Dr. Macan are not at all equal to the mesial incision he practises and recommends; the single lateral incision does not give as much space, and the bilateral incurs the risk of gangrene. Dr. Macan takes exception to his morbidity tables. When he became Master in the Rotunda he found them as they had been drawn up by Dr. Smyly; he liked them and adopted them, and he had heard nothing that would cause him to change his opinions. As for his case of aphasia and of its connection with the puerperal condition, he commends it to Dr. Macan's leisurely study; that he (Dr. Macan) should ask unequivocal proof is natural. He recently saw his patient, and he is happy to say she is quite well, speaking quite freely. The lungs of his embolic patient were not examined immediately on her readmission; the woman was in a state of collapse, but they were examined within forty hours of the time, and he might add that there was an early pyrexial stage in the case. Dr. Macan was not satisfied with the success of their prophylactic treatment of *ophthalmia neonatorum*, although they had only four cases out of more than 1,600 children. All he could say was that Dr. Macan is hard to please. They used from one to three drops of a 2 per cent. solution of nitrate of silver. Dr. Jellett stated that the table of mortality was forgotten, but there was no forgetfulness in the matter at all. Three patients died during the year, and on the sixth line of the Report they are recorded. Of the two cases he cannot find in the "interesting cases," one is told with the necessary fulness in Table III., and the other is included in the "interesting cases." He had already stated that pelvic measurements are very carefully taken. His teaching *re* the plug is that when strong pains begin it is to be removed; there are, however, multiparæ, whose pains expel the plug before its protrusion has attracted attention. As for the objection to the term menstruation, it is futile; for all he (Dr. Purefoy) knows, the child may have menstruated at the next monthly period. The question of version or allowing the head to be moulded to the passage is decided in every case by its circumstances. If the head is in a favourable position and the patient in a good state of health, the case is allowed to proceed; otherwise version is performed.

OBSERVATIONS ON THE FIRST STAGE OF LABOUR: ITS CAUSAL RELATION TO UTERINE RUPTURE.

By E. HASTINGS TWEEDY, F.R.C.P.I.;
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[Read in the Section of Obstetrics, May 23, 1902.]

The first stage of labour can correctly be stated to comprise the period in which the os is in process of dilatation; its beginning is not so easily indicated, nor has its ending been defined with precision. Doctor Berry Hart has pointed out the futility of considering painful contractions of the uterus as indicative of its commencement. A uterine contraction without pain is certainly no indication, nor yet can the presence of a show—*i.e.*, blood-stained mucous discharge—with accuracy be said to mark its origin. Again, cervical dilatation is of no reliable significance, for a patulous canal is not infrequently present long before labour begins. It seems to me that an accurate definition of the commencement of labour must take cognisance of that peculiar phenomenon known as uterine polarity. It this be so, then a contraction of the body of the uterus, accompanied by a relaxation of the circular fibres in the cervix, the processes being interdependent, will mark the commencement of labour.

The occurrence of uterine polarity does not seem to have received any sufficiently reasonable explanation. The one I now offer has at all events the merit of simplicity.

The arteries, veins, and nerves which pass through the lower uterine segment must be subjected to a considerable amount of stretching force during the sudden increase of its area brought about by a labour contraction. That the circulation

suffers is evidenced by the serous infiltration and softening of the cervix, a result of impeded venous return. Hence congestion occasionally terminates in rupture of the vessels and the formation of a cervical hæmatoma. In a similar manner there seems little doubt that the nerves must be affected. Nerve impulses are easily inhibited by the overstretching of a nerve; and when once this takes place a paresis of the circular muscle fibres in the cervix to which these nerves are distributed will occur. A consideration of these views makes the etiology of uterine polarity quite understandable, and affords us a scientific basis for determining the onset of labour.

If we now turn to the ending of the first stage of labour, I find myself in sharp disagreement with the generally received definition of it—viz., that it terminates when the os is fully dilated. It is in my opinion erroneously held that a fully-dilated os is at all times capable of permitting the passage of the fœtus through it. Abundant evidence is forthcoming to show that this is not so. Our dispensaries teem with patients suffering from torn cervices, the result of so-called normal delivery. Some of these no doubt may fairly be considered to result from misdirected efforts on the part of the attendant to hasten delivery, but a large number still remain that cannot be accounted for in this manner. These are the cases in which the first stage of labour has not ended on the full dilatation of the os, but rather at the time of the tearing of the os to permit of the passage of the fœtus through it. This condition, induced by tension, may be more readily understood if we call to mind the somewhat analogous process which is observable in phimosis. If the blades of a forceps are pushed through the orifice of a phimosed prepuce, and then opened with force, so as to bring about full expansion of the ring, we find that it assumes hard and rigid characteristics with a knife-like unyielding edge. Similarly the os stretched to its fullest expansion becomes knife-edged, with

thin unyielding walls, and we speak of the condition as "rigidity of the os." When once the os has reached this stage of expansion, it tears with the greatest facility, either spontaneously, or in consequence of manipulations, carried out, perhaps, in the gentlest manner possible. This rupture, moreover, is hard to recognise as such by the fingers of the examining hand, even during the process of its occurrence. An apparently very rapid dilatation is felt, resembling closely the sudden relaxation of a spasmodic stricture. It is probable that in this way arose the erroneous notion that a rigid os is the result of a muscular spasm. A moment's thought will demonstrate the untenability of such a theory. The fact that in spite of this so-called muscular spasm the os remains open, though the function of the contracting muscle is to cause its closure, is sufficient to show the impossibility of associating in any causal connection the conditions one with the other. There seems little reason to doubt that a rigidity such as I have described indicates an expansion of the os to its utmost limit short of a solution of continuity taking place. An os in this state, incapable of further expansion, is still subjected to the pull of the uterine contractions throughout its entire circumference. These contractions are not equally effective in all directions. In the tug-of-war that takes place between them the posterior fibres gain the mastery of the others, the result being that the posterior cervical lip is taken completely up, and becomes continuous with the post-vaginal wall. If the os cannot expand it is evident that it must follow in the wake of the disappearing posterior cervical lip, and thus we find it moving in a direction upwards and backwards, dragging in its progress the anterior cervical lip after it, and causing that structure, in common with the anterior lower uterine segment, to thin out more and more. This thinning, brought about as just described, is at times so extensive that it closely simulates unruptured membranes, and may give the

mistaken impression that the os is fully open. I have even known an attempt to be made to apply forceps under such circumstances. A cervix drawn out and thinned in this manner is erroneously said to be incarcerated, or nipped between the pubes and presenting part of the fœtus, and thus its inability to retract is accounted for. It is highly improbable that nipping of the cervix between the smooth pubic walls and the equally smooth fœtus is, under the conditions generally present, possible. Moreover, were it so incarcerated, its liberation would be attended with infinitely greater difficulty than is experienced in the manipulation ordinarily advised for effecting this purpose. This manipulation not infrequently results in the tearing of the cervix.

If these views are accepted it becomes at once evident that the ending of the first stage of labour cannot without exception be defined as occurring when the os is fully dilated. The elongated anterior cervical lip, set free by rupture, becomes rapidly œdematous during the further progress of labour, and is occasionally found protruding through the vulva after delivery. It is extraordinary to note the slight extent to which this complication has arrested the attention of obstetricians. It has been wrongly described as a hæmatoma of the cervix, and I have known of one instance in which it was torn from its attachments under the mistaken impression that a portion of adherent placenta was being dealt with.

So far I have described rigidity of the os, and the events which follow from it in cases of primiparæ. In them the infra-vaginal cervix is the weakest portion of the uterus, and its readiness to tear lessens the liability of the organ to rupture elsewhere.

In multiparæ, on the other hand, the deposition of fibrous tissue in the neighbourhood of old lacerations often renders the cervix exceedingly tough and inelastic, and thus interferes with its dilatation. Under these circumstances we have,

as a result of this moving upwards and backwards of the os, great thinning of the anterior cervical lip. This lip will be formed by the anterior fornix of the vagina below and the anterior lower uterine segment above, the two structures lying one on top of the other. In the event of the os neither dilating nor yet tearing, a rupture of the lower uterine segment and vaginal vault is very likely to occur, as they become more and more thinned out by the pressure downwards exerted on them by the presenting portion of the fœtus and the counter forces exerted by uterine muscles at either side. Occasionally, however, it is the posterior fornix and posterior lower uterine segment that are torn. This can be explained by remembering that the uterine and posterior vaginal walls become continuous after the taking up of the cervical lip. The uterus thus may drag itself free from the vagina, the tear being continued into the cervix and up the lateral walls of the uterus.

It is a curious fact that three-fourths of uterine ruptures which have been reported as occurring in Dublin within the past ten years were complicated by vaginal tears, while such ruptures are by no means the kind most commonly met with elsewhere, as all statistics show. Another point of interest in connection with our Dublin cases arises from the insidious method of their occurrences. Observer after observer has noted that in many instances the catastrophe was not preceded by signs which we are taught to associate with impending rupture. Moreover, it is in those cases in which the vaginal tear complicated the rupture that an absence of premonitory symptoms was noted. In consequence of the rarity of pelvic contraction amongst us, uterine rupture is not often encountered. The cases reported favour the belief that rupture takes place not often as a complication of the second stage of labour, but of the first.

Should these views be accepted, then the moving upwards

and backwards of the os, which at the commencement of labour had been centrally situate, might well be regarded as a premonitory sign of rupture.

To summarise the points which to me seem of interest :—

1. The first stage of labour begins when the polarity of the uterus is established.

2. Uterine polarity results from an overstretched condition of the nerves which course through the lower uterine segment and are distributed to the circular muscular fibres of the cervix. The painless uterine contractions and retractions of pregnancy thin out and stretch the segment, and thus ultimately induce polarity.

3. The cervix being fully dilated does not necessarily imply a sufficiently open os to permit of the passage of the fœtus.

4. The anterior cervical lip is not easily nipped or incarcerated between the pubes and the descending fœtus. The cause of its elongation is due rather to the retraction of the posterior cervical lip and the consequent dragging upwards of the os, which cannot sufficiently dilate to permit of the passage of the fœtus through it.

5. Such an os will in the case of primiparæ rupture almost certainly in order to permit of the commencement of the second stage of labour—*i.e.*, an expansion sufficiently large to permit the passage of the greatest diameter of the presenting portion of the fœtus through it.

6. Such a laceration cannot be treated by immediate suture, not alone because of the great œdema of the anterior lip, but chiefly for the reason that the posterior lip is taken up, and there is therefore nothing to which to stretch it.

7. A multiparous cervix is not always the weakest portion of the uterus. When this is so, a uterine rupture occurring as a consequence of rigid os will be preceded by none of the usual premonitory symptoms, and the tear will be most likely to involve the vagina.

Dr. Horne said that in his experience cases of ruptured uterus were usually associated with contracted pelves, and were consequently unusual in Dublin, where the condition named was seldom met with. He did not look on the strong pains as the principal cause; he rather inclined to the idea that insufficient dilatation or dilatation slowly occurring was the chief factor, the head being shoved through, not being pressed through. The occurrence of the rupture on the left side was clearly due to the position of the woman on her left side during the labour.

Dr. Purefoy said he would like to know if Dr. Tweedy considered that a rigid os was the normal condition in primiparæ; such an idea seemed to him to be novel and startling. He would also like to hear what Dr. Tweedy considered as full dilatation of the os. In his experience, he did not find the pulling up of the posterior lip to be a precursor of rupture. The number of cases of rupture occurring in practice is small, and in his opinion uterine rupture is not nearly so often complicated with rupture of the vagina as Dr. Tweedy states (75 per cent.).

Dr. Alfred Smith said that he did not see much benefit from Dr. Tweedy's new definition. Polarity was hardly a practical term. The old definition of the beginning of labour was equal to all demands. He expected to have heard something of the type of pelvis, the rigidity of the os, and the character of the pains from Dr. Tweedy.

Dr. Jellett said that he recognised that dilatation of the external os was not a sign of labour; he would be inclined to consider that dilatation of the internal os was such a sign. He did not accept Dr. Tweedy's explanation of polarity; he associates it more with some regulating nerve fibres connected with the higher nerve centres which regulate the muscular contractions, in a manner analogous to the simultaneous contractions of the fibres of the body and relaxation of the sphincter of the bladder and the rectum. In his opinion the first stage of labour ends clinically with rupture of the membranes.

Dr. W. J. Smyly said Dr. Tweedy's paper dealt with two subjects—the first stage of labour and rupture of the uterus. Much depends on where he considered the polarity begins; if he included the whole lower uterine segment the labour may be said to commence at the seventh month of pregnancy. He looks on Müller's ring as a very uncertain point from which to count. If the lower

segment of the cervix is included it is equally faulty. Dr. Jellett's definition cannot be accepted, for rupture of the membranes has occasionally occurred months before labour. Why does the cervix rupture? He is not satisfied with the statement "when it has reached the greatest possible amount of extension." He considered the rupture to be caused by want of a proportionate rate of dilatation of the os and the force of the expelling pains. The paper is of value as causing them to discuss a subject which is one of extreme interest.

Dr. Hastings Tweedy, in replying, traversed the assumption that the os never tears in normal deliveries, so-called, and when the membranes have not prematurely ruptured. Such a view is contrary to conditions that obtain in other structures of the body, as, for instance, the perineum, which will at times rupture, despite the gradual and prolonged efforts to dilate it. Elongation of the anterior cervical lip is a condition frequently encountered, and this, in his opinion, indicates that the os has ceased to respond to the forces which cause its expansion. As to the injection of cocaïn into the edge of a rigid os and the supposed relaxation of the structure thereby being cited as proof of its origin in muscular spasm, he could conceive of nothing more far-fetched. Cocaïn had no effect on motor nerves, and many reasons could be adduced to account for this supposed condition of relaxation more reasonable than the one given. He did not agree with Dr. Jellett that from a practical point of view rupture of the membrane may be taken as an indication of the commencement of the second stage, as from that time the danger of retarded delivery commenced. Such an assumption implies the complete draining away of the liquor amnii, which, of course, does not occur after rupture of membranes, save under abnormal conditions. He did not see that any analogy could properly be drawn between the bladder mechanism connected with urination, and that of the uterus in the first stage of labour. The formation of the lower uterine segment during pregnancy causes considerable displacement of the vessels and nerves, as these have to course through this segment in order to reach the cervix. In consequence of this the relaxation of the os during the period of a labour contraction can be accounted for in a manner more simple than the inferring a special nerve centre which has so rarely to be called into existence.

SECTION OF PATHOLOGY.

ON THE *RÔLE* OF THE PROTOZOA IN THE CAUSATION OF DISEASE.

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[An Address delivered at the Opening Meeting of the Section of Pathology, November 1, 1901.]

When I became aware that, on assuming the office of President of this Section of the Royal Academy of Medicine, I should have to deliver an Opening Address, my first impulse was to select as my theme one or other of the bacteriological questions that at present excite the liveliest discussion—the problems of Immunity or those of Tuberculosis. On reflection, however, I saw that immunity is at present in such a complex state, weighted down with multiplicity of observations and abstruse hypotheses, that it would be difficult within the space of time at my disposal to lay even a fairly complete presentment of it before the Section. Another good reason for not taking it up was that my predecessor, Professor O'Sullivan, in his opening address, delivered in this hall two years ago, has treated a certain aspect of that question in a very admirable way. The other great question of the hour—the doubts cast by Professor Koch on the transmissibility of bovine tuberculosis to the human subject—is one that can be solved only by actual observation and experiment.

Until a sufficient stock of new facts has been accumulated further discussion of that question is a mere futility.

There is, however, a subject less complex than that of immunity—more novel, and, especially of late, more fruitfully developed than that of tuberculosis—the Parasitic Protozoa. Not being adequately treated of in the text-books, it has the additional advantage of being, perhaps, less familiar to those of my hearers who have not the leisure to keep abreast of the development of our knowledge in the original sources. Besides, the minute animals concerned are not so readily obtainable for purposes of study as their vegetable congeners, the Bacteria. Not being susceptible of pure cultivation on artificial substrata, they cannot be kept alive in the laboratory for unlimited periods, and are, consequently, inaccessible for study, save when cases of the diseases occasioned by their parasitism come under observation. When I add, further, that one of the most widespread diseases, malaria, is known to be due to protozoal parasites, that vaccinia and small-pox are, with the highest probability, ascribed to the activity of organisms of this nature, and, finally, that a not inconsiderable number of competent observers hold that the cause of cancer—that most dreaded and most mysterious of maladies—is to be looked for in the irritation of epithelial cells by the presence of parasitic intruders of protozoal affinities, it will, I think, be admitted that the subject is one which, if properly treated, ought to prove both interesting and instructive. Whether I shall succeed in making it either the one or the other you must be the judges.

The Protozoa are the lowest animals, each individual consisting of one cell only. This cell must exercise the several functions which, amongst the Metazoa, are exercised by the groups of differentiated cells termed

"organs." It must move, feed, and multiply, and the manner in which the protozoal cell contrives to discharge these three all-important functions serves as the basis of classification.

There are four great classes of Protozoa—the Rhizopoda, the Sporozoa, the Flagellata, and the Infusoria.

The parasitic forms that interest us upon this occasion belong, for the most part, to the second of these classes: one, *Amœba coli*, is a Rhizopod. The *Flagellata* include forms that play a subordinate *rôle* in human pathology, though of the greatest importance with reference to the lower animals. As regards the highest class, that of the Infusoria, I shall have nothing to say at present, save that the pathogenesis of *Balantidium coli* (the chief organism of this class found in the human subject) is still *sub judice*.[a]

The Rhizopods are the simplest of all known forms of life. They consist of a single cell which moves without limbs or muscles, takes in food without a mouth, and digests it without a stomach, excretes without kidneys, and manifests irritability without a nervous system. The typical form is the *Amœba*, a shapeless mass of protoplasm, provided, as are all cells, with a nucleus. There are no permanent locomotive organs such as exist in the higher Protozoa; the animal creeps about by means of projections of the outer clear layer of its protoplasm called pseudopodia. These are constantly being protruded and withdrawn, so that the shape of the animal is in a perpetual state of flux. When circumstances are unfavourable it withdraws all its pseudopodia, assumes a rounded

[a] Since writing the above, I have met with a capital paper by Solovieff [Centralbl. f. Bakt. u. Parasitenk. Abth. I. Bd. XXIX., pp. 821 and 849] which conclusively proves that ulcerative colitis may be caused by this Infusorian. The appended bibliography shows that the majority of previous observations of the parasitism of *Balantidium* have been made in Russia. Solovieff's case occurred at Tomsk, in Siberia.

form, becomes coated with a hard, refractive shell, and is then said to be encysted. This encystment is merely a latent phase of life, and is not connected with the reproductive function as it is in the higher classes of Protozoa. The only method of multiplication which the Amœbæ are certainly known to possess is simple division of the parent organism into two daughter cells, each of which carries away one-half of the original nucleus. Whether mitotic changes always occur in the latter is still uncertain. That they do in some cases is undoubted. Food particles that have been absorbed into the body of Amœbæ become surrounded by a clear area called a vacuole, containing a digestive liquid, proved by Metschnikoff and Le Dantéc to have an acid reaction. The food granule immersed in this liquid gradually melts away, save for the indigestible fragments which are finally expelled by contraction of the vacuole. [*A semi-diagrammatic tinted drawing of Amœbæ was here thrown on the screen.*]

Amœbæ are normal occupants of the human intestine. Lambl first saw them there in 1870. Schuberg demonstrated them repeatedly in the stools of healthy individuals after administration of Carlsbad salt. Lösch, in 1875, ascribed dysentery to their parasitism; Koch, in 1887, found them in the intestinal wall of patients dead of tropical dysentery. Kartulis found them in the liver-abscesses that form so frequent a complication of this form of dysentery. Councilman and Lafleur, working at the Johns Hopkins Hospital in 1890-91, and Kruse and Pasquale, working in Egypt in 1892, further extended our information and made it precise. The literature on the subject is very extensive and readily accessible to anyone who will consult the usual sources. All up to 1898 is quoted in Ciechanowski and Nowak (*Centralbl. f. Bakt.*, Abth. 1, Bd. XXIII., p. 445). The difficulties in the way of forming

a definite conclusion as to whether the *Amœbæ* are really the cause of dysentery are briefly as follows:—Similar Rhizopods are known to occur in the bowel of healthy individuals; they have been absent in cases of genuine tropical dysentery; leucocytes and large flat cells of "endothelial" type are liable to be mistaken for them. Hence too much confidence cannot be placed in many of the reputed positive findings. They have been found in a liver-abscess where there was no dysenteric change in the bowel, but only tubercular ulceration. [Kartulis in *Virch. Arch.*, Bd. 148, p. 106.] They have not as yet been cultivated, hence the evidence obtained as to their pathogenicity by animal experiment is not free from objection, as other substances of an irritating nature are contained in the mucus or pus in which they occur, and, injected along with them may possibly account for some of the positive results that have been recorded. Thus, for instance, Gasser (*Acad. de Méd. Exp.*, 1895) found that on injecting into the rectum of cats sterilised sand he obtained ulcers not dissimilar to those resulting from the injection of dysenteric material. It is difficult, however, to reject some of the results obtained by Quincke and Ross (*Berl. klin. Woch.*, 1893, p. 1089), Kartulis (*Centralbl. f. Bakt.* IX., 1891, p. 365), Kruse and Pasquale (*Ztschr. f. Hyg.*, 1894, p. 1), and Zancarol (*Rev. de Chirurgie*, T. XIII., 1893, No. 8), who obtained typical dysentery by injecting the pus of liver-abscesses—sterile, so far as freedom from bacteria is concerned, but containing *Amœbæ*—into the rectum of cats. The general conclusion to which I incline, after a careful survey of the literature, is that the *Amœba coli* is in all probability either wholly or partly responsible for the causation of one form of dysentery—viz., the form termed tropical by Councilman and Lafleur, which is not endemic in this country. Whether a genuine

case of this kind has ever been recorded from Ireland I do not know.[a]

There is another parasite, usually classed with the *Myxomycetes*, or slime-fungi, but placed by Delage amongst this lowest class of the Protozoa—namely, *Plasmodiophora brassicæ*, which produces in turnips and cabbages appearances somewhat analogous to tumour formation. I will reserve its description until I come to the ætiology of cancer.

The second class of Protozoa is the Sporozoa. In their adult stage these are amœbiform organisms possessing a distinctive mode of reproduction, which consists essentially in the formation of numerous minute spore-like bodies within a cyst or capsule, the whole process reminding one somewhat of what takes place in puff-balls. There are several subdivisions, all of them interesting. Most highly organised and largest are the *Gregarinidæ*, which are parasitic in Worms, Crustacea, and other Invertebrates, but not in Molluscs or Vertebrates; hence I pass them over in silence. Next come the *Coccidia*, and here, although these creatures have been very rarely met with in man, some description is called for on account of the close relationship in which they stand to the malarial organisms, and also because cancer has been of late years frequently attributed to the parasitism of *Coccidia*. It is in the rabbit that this kind of parasite is most readily observed. A large proportion of the animals in many hutches are found on examination to harbour *Coccidia*, either in the liver (*C. oviforme*) or in the intestinal wall (*C. perforans*). When badly affected, the animal is weak, anæmic, suffers from tympanites and diarrhœa, and succumbs to marasmus in a

[a] Satisfactory evidence that the dysentery endemic in East Prussia is of amœbic origin has since been given by Jaeger. Naturforscherversammlung zu Hamburg, 1901.

few months. At the autopsy the liver is more or less hypertrophied and studded with whitish specks and patches, varying in size from a millet-seed to a small pea, and internally consisting of a creamy mass with numerous encysted Coccidia. Sections reveal a trabecular structure covered with columnar epithelium, evidently derived from the bile-ducts, the cells of which are invaded by the rounded or oval parasites which push the nucleus to one end, and come to occupy the main bulk of the cell.

[*Micro-photographs of sections of the affected bile-ducts were here thrown on the screen.*]

These Coccidia, when mature, fall away into the cavity of the bile-duct, and reach the intestine, whence they are expelled together with the excrement into the outer world. There are two species of Coccidia found in the rabbit, one inhabiting the liver, the other the intestinal wall, and as their life history is practically identical, and is of the utmost importance for a thorough comprehension of the parasitic Protozoa in general, I shall now describe it, beginning with the mature organism as found in the excreta of the affected rabbit. They are roundish or oval bodies, usually between 30 and 40 μ long, and 18 to 20 μ wide, consisting of a thick double-contoured wall, which is transparent, and highly refractive, and encloses a roundish granular mass of protoplasm, which does not fill up the whole interior space. The resemblance to the egg of some intestinal worm is very striking—hence the specific name, *oviforme*. It will be well to employ the nomenclature suggested by Schaudinn, who has done a great deal of work on these and allied forms of protozoal parasite, and terms the mature coccidium the *Oocyst*, and its sphere of contained protoplasm the *Sporont*. When the oocyst is kept under observation in the hanging-drop or moist chamber, the contained sporont swells up, and its

nucleus divides into four parts, each of which becomes surrounded by a portion of the protoplasm, so that the oocyst now comes to contain four nucleated cells, each of which is called a *Sporoblast.* Each of these becomes surrounded by a very tough, impermeable wall, and is then called a *Sporocyst,* or, shortly, a *spore.* The four spores so formed are ultimately set free by the rupture of the containing cyst-wall. The nucleus of the spore has meanwhile undergone division, and two crescentic or sickle-shaped daughter cells, called *Sporozoïtes,* are produced, a not inconsiderable fraction of the protoplasm being left unused—a phenomenon very frequent among the Protozoa. The unused part of the protoplasm is called the *Restkörper* by the Germans, the *corps de réliquat* by French biologists. The crescentic shape of these bodies, and the peculiar way they are pressed together, are highly characteristic of this group of parasites, and will be met with again by and by when we come to speak of the malarial organism.

The spores, with their contained sickles, being highly resistant, remain alive for an indefinite period in the dust of the rabbit hutch or run, till they are swallowed by another rabbit, when they burst, and the contained *Sporozoïtes* are set free, and, becoming amœboid, bore their way by means of their anterior end, which seems to be sharper and harder than the rest of their body, into a cell of the biliary or intestinal epithelium of the new host. Once inside the cell the amœboid Sporozoïte becomes converted into a rounded mass of very granular protoplasm, which rapidly increases in size, pushes the nucleus of the host-cell away to one end, comes to occupy the entire cell, becomes oval, develops its cyst wall, and is then as an "oocyst" ready to fall away into the lumen of the cavity concerned.

This developmental cycle, first followed by Leuckart,

would not, however, satisfactorily account for the extreme degree to which the affected animals are liable to be infested, every epithelial cell for a considerable length of bile-duct or intestine being found to harbour several Coccidia of various sizes and ages, the so-called multiple infection or *Mehrlings-infektion* of the Germans. It was noticed by R. Pfeiffer in 1892 that Coccidium-like forms occurred in the rabbit's intestine which were devoid of thick capsule, and which divided up interiorly into a *large number* of sickle-shaped bodies, such division taking place *directly* from the protoplasm of the Coccidium without the intervention of an intermediate or Sporoblast stage. Pfeiffer considered this to be a condition of sporulation adapted for the multiple-infection of the same individual. He showed that the reproductive process of Coccidia did not of necessity involve encystment and sporoblast-formation, nor expulsion from the intestinal canal. On attaining their full size in the epithelial cell they at once underwent division into a large number of Sporozoïtes, which invaded the neighbouring cells, and, repeating the process, produced that extreme degree of infection which is so characteristic of this parasitic disease. As soon as—through exhaustion of the system of the host-animal, or its saturation with the metabolic products of the parasites—these latter begin to find their surroundings somewhat less favourable, instead of proceeding at once to Sporozoïte-formation, they became converted into the permanent cysts, with their contained Sporoblasts, and were expelled from the bowel to seek a new home in another animal of the same species.

These views of Pfeiffer were not universally accepted, and met with considerable opposition in France, where the leading authorities on this subject—Schneider and Labbé—considered that the parasite found sporulating in

the bowel was different from that found in the fæces, and created a new genus for it, which, in honour of its discoverer, they called Pfeifferella. That the two cycles of development really belonged to the same organism was demonstrated in 1897 by Léger, Schaudinn, and Siedlecki, and by Simond. Names for the several phases of the endogenous cycle were suggested by Schaudinn, who terms "*Schizont*" the parent organism, undergoing segmentation within the host-animal—this stage being homologous with the encapsulated "Sporont" of the other cycle. The sickle-germs so produced he terms Merozoïtes. They are homologous with the Sporozoïtes of the other cycle. According to this view when an Oocyst is taken with food into the alimentary canal of a hitherto unaffected animal, the 8 Sporozoïtes developed from it invade epithelial cells and attain maturity in the shape of rounded, granular, non-encapsulated, protoplasmic masses—the *Schizonts*. These divide at once into numerous Merozoïtes, which invade fresh cells, and so on through many generations until a period comes when circumstances become less favourable, reproduction ceases within the host animal, and permanent cysts are formed—"oocysts"—intended to mature outside the body and infect fresh animals.

Now, the termination of the endogenous or schizogonous cycle and the commencement of the exogenous or sporogenous cycle has been found to be occupied by a most remarkable sexual process strictly comparable to that which obtains in the higher animals. When the rate of endogenous multiplication begins gradually to slacken two forms of mature parasites are to be found. One is larger, its protoplasm more richly stored with food granules—the *Macrogamete*. The other smaller and less granular—the *Microgametocyte*. The nucleus of the latter divides up into many smaller nuclei, which assume a peripheral position, and

ultimately detach themselves from the mother cell, each taking with it but a very thin coating of protoplasm. The resultant bodies are called Microgametes. They bear a close resemblance to the Antherozoids of liver-worts and mosses, and discharge the same functions as these and as the Spermatozoa of the higher animals. Provided as they are with one or two flagella, they move actively in the direction of the nearest Macrogamete, into which one of them penetrates and disappears, its nuclear substance being fused with that of the female reproductive cell. A double wall is then formed round this conjugation product or *Zygote*, and it becomes an *Oocyst* and is ripe for expulsion into the outer world. Once outside the host-animal it forms the four spores, each of which with its two *Sporozoïtes* is ready for infecting a fresh animal. Such is the marvellous history of these parasites. In recounting it I would gladly have dwelt upon the interesting nuclear phenomena, including the reduction of chromosomes, by which sexual reproduction is preceded. In view of the unavoidable length of this exposition I have felt it necessary to refrain. Before leaving this part of the subject I would emphasise three points. First, the Coccidia are *intra*-cellular parasites; second, they produce in animals cachexia and appearances suggestive of adenomatous tumour-formation; third, it has consequently occurred to many workers that similar intracellular parasitism may be the cause of malignant new growths in the human subject, and the search for Coccidia has been industriously yet unsuccessfully prosecuted.

The first half of the last decade of the 19th century was a period of great activity in this field of work. Russell's "fuchsin-bodies" were the first of a series of objects demonstrated in the interior of cancer cells by the aid of special fixing and staining methods. Korotneff found a whole Gregarine, as he thought, lying amongst the cells of

the only epithelioma he examined. He created a new genus and species for it—*Rhopalocephalus carcinomatosus.* Then came Ruffer and Walker and Plimmer with cell-inclusions which they concluded to be Protozoa. They in-invoked the authority of Metschnikoff in favour of this interpretation of what they saw, but could not cultivate their organisms, or obtain satisfactory results from inoculation experiments. On the Continent L. Pfeiffer, the founder of our knowledge of parasitic Protozoa, adopted the view that the small cells often to be found around the advancing margins of cancerous neoplasms were really parasites. He gave them the name of *Amœbosporidia.* He very kindly sent me at the time some photographs, which I now show. Their interest is purely historic. Nils Sjöbring, Soudakevitch, and many other workers industriously described intra-cellular "inclusions" of various kinds which they thought to be Protozoa. [*Micro-photographs of some of these were thrown on the screen.*]

Later on, the interpretation of the appearances changed and, mainly in Italy, the view gained credence that the bodies in question were not animals, but minute plants belonging or allied to the group of the *Saccharomycetes* or yeasts. By the aid of highly specialised histological *technique,* Sanfelice, Roncali, Binaghi, Piancse, and many others satisfied themselves of the existence of organisms of this nature in cancer cells. Sanfelice succeeded in growing similar organisms from fruit-juice and obtaining positive results by injecting the cultures into animals. To the species so isolated he gives the name of *Sarcharomyces neoformans.* During the last few years Plimmer also claims to have cultivated from cancer tissue an organism of this nature. He made a communication on the subject to the Royal Society in 1899, and wrote a paper in the *Practitioner* describing his results. His organism was obtained

from a specimen of rapidly-growing breast-cancer. The cultures were made on a liquid medium consisting of decoction of cancer tissue with glucose and tartaric acid. Growth took place under anäerobic conditions, and what he calls the virulence of the organism was best maintained in this way. He seems somewhat uncertain as to the biological position of the organism; whether to rank it with the Protozoa or with the Blastomycetes. When we consider that Plimmer has had his organism under pure cultivation, and has performed numerous animal experiments with it, to find him still uncertain as to whether it ought to be placed amongst the Yeasts or the Protozoa is not reassuring. I have read his paper in the *Practitioner*, and it seems to me open to grave criticism under various heads, to enter upon which would be to take up a great deal of time, and would be outside the scope of my endeavour in this address. The industrious and persistent efforts that have been made in various quarters to identify these cell-inclusions with Protozoa are praiseworthy, but show a lamentable want of knowledge of the zoological aspect of the question, without a competent training in which the most painstaking endeavours to correctly appreciate the nature of a cell-inclusion must of necessity fail. The hunt for cancer-parasites has rightly been stigmatised by Schaudinn as one of the most melancholy chapters in the investigation of the Protozoa.[a]

That tumours of parasitic origin occur in plants is well known. Leaving out of consideration the numerous variety of Galls as not producing constitutional disturbance in the host plant to such an extent as to justify us in applying to them the term "tumour," we have in *Plasmodiophora brassica* (Woronin) a capital example of a Pro-

[a] Since the above was written a recrudescence of the parasitic hypothesis has taken place in Germany under the auspices of v. Leyden.

tozoal (or Myxomycetal) parasite setting up in plants belonging to the order Cruciferæ, especially in the cabbage and turnip, a malignant tumour process leading to cachexia and death. Through the kindness of Professor Carroll, Principal of the Albert Agricultural Institution, Glasnevin (Department of Agriculture and Technical Instruction), I have obtained some specimens of plants so affected. [*Demonstration.*] I think you will agree with me that the resemblance to ulcerating epithelioma in some of the cabbage stalks is very striking. Our peasants apply the term "club root," "finger-and-toe," and "anbury" to the disease as it affects turnips. It is a source of serious loss in some parts of the country, especially in Co. Wexford. The organism producing it is, in its adult stage, a shapeless mass of protoplasm, like a huge amœba, termed a plasmodium. It lives in the interior of the plant cells and destroys them. After a while it divides up into a vast number of minute fragments, each of which becomes rounded-off, encapsulated, and forms a spore. When set free by the decomposition of the affected root the spores burst, their contents emerge as a minute amœba, and the swarms of amœbæ so formed coalesce to form a plasmodium, then attack another plant, and so on. I now show sections of sublimate-fixed material showing the spores with their shrunken protoplasmic contents lying close-packed in the large parenchyma cells of the turnip. [*Demonstration.*] Professor Podwyssozki of Kieff has recently (*Centralbl. f. Bakt.*, Vol. XXVIII., No. 3) endeavoured to show that tumours may, in rabbits and guinea-pigs, be produced by injecting these spores. To me, however, his description reads more like production of inflammatory tissue through introduction of a foreign body rather than true tumour-formation.

Passing now from the Coccidia, real or supposed, we

shall take up the consideration of the next order, the Hæmosporidia, to which belong the parasites of the several forms of malaria. Much has been written on this subject during the last few years, and many wonderful discoveries have been made. They have excited so much attention that the leading facts may be assumed as familiar to my hearers, and it will remain for me only to shortly trace the development of our knowledge and demonstrate on the screen the close similarity between the developmental cycles of the malarial plasmodium and of the *Coccidium*, my object being to show that what we know of the malarial parasite does not constitute an isolated group of phenomena, but is merely what we should expect, having regard to the biological position of that organism.

Laveran discovered the parasite in the red corpuscles of man in 1880. Golgi, in 1886, differentiated the several forms of parasite corresponding to the clinical varieties of the disease. Its sporulation accounted for its increase within the human body. How it obtained entrance to, or exit from, the human body remained a mystery. In 1896 Patrick Manson, guided by his previous discovery of the development of the *Filaria sanguinis hominis* in the mosquito, announced his suspicion that the malarial parasite might also be withdrawn from the human body by the agency of that insect. About the same time Bignami in Italy put forward his view that malaria was caused by the bite of mosquitoes—an idea that had prevailed in Italy amongst the common people ever since Roman times. The difference between Manson's view and Bignami's was this: Manson thought the parasite was sucked up together with blood by the mosquito, and thus escaped into the outer world. When the mosquito died in or near water the parasite might, he

thought, pass through a stage of development in the pool, and then perhaps get back into human beings who drank the water. Bignami thought that the mosquito took up the parasite somewhere and introduced it into the human body. How it got out again he did not explain. Each writer strove to accumulate facts in support of his hypothesis. Manson set Ross to work. Bignami went to work himself so far back as 1894, aided by Dionisi. Their efforts remained fruitless at first, because, no doubt, they were working with the wrong species of mosquito. Ross meanwhile was more successful. His results on human malaria being unsatisfactory, he turned his attention to the malaria of birds affected with the parasite *Proteosoma Grassii*, and soon established the following facts. The blood of birds containing the parasite is sucked up by the mosquito. The parasite develops further in their stomach, bores its way through the wall of the intestine, and on the cœlomic aspect of the latter, forms cysts the contents of which break up into innumerable tiny rods, germinal rods, which are after a while emitted into the body cavity, but ultimately become collected into the salivary or poison gland and its duct leading to the proboscis. Thence they pass into a hitherto unaffected bird, when an infected mosquito sucks its blood. This remarkable discovery was published by Ross in 1898. Meanwhile Grassi went to work on the basis of Bignami's inoculation theory, to find which of the many sorts of gnat found in malarial districts in Italy was concerned in propagating the disease, and after considerable labour in excluding various commonly occurring forms, such as *Culex pipiens*, concluded that the distribution of a large greyish mosquito *Anopheles claviger* (Fabr), was practically co-extensive with that of malaria. In collaboration with Bignami he began trying to artificially infect patients

by subjecting them to the bites of mosquitoes. After several failures they at last obtained positive results. Patients who had never had malaria, and were kept in a room at the San Carlo Hospital, developed typical seizures after being bitten by mosquitoes of this species. As the result of further researches of Grassi, Schaudinn, Koch, Daniels, and others, it was found that the species of the genus *Culex* were responsible for propagating the malaria of birds, whilst that of man was disseminated by species of *Anopheles*. There were, however, some obscure points in the life-history of the parasites which had not as yet been explained. Crescentic forms of the parasite had been for many years observed in the blood of patients affected with tropical malaria. Some of these had been seen to change their shape to oval, and subsequently to become round, and then to shoot out or give off actively motile filaments which detached themselves from the parent sphere and, wriggling away, were lost to sight. The "flagellate bodies" were usually held to be agonal or degenerative forms due to the unfavourable environment and fall in temperature experienced by the parasite on being withdrawn from the circulation. If Manson's views were correct, the crescent ought to undergo its further development in the mosquito's stomach, and Ross on making the experiment by examining the contents of the stomach of a gnat shortly after it had bitten a patient suffering from malarial cachexia, and whose blood contained numerous crescents, found that all of them rapidly assumed the spherical form, and that from nearly half of those the problematical flagella were emitted with a hitherto unexampled rapidity. What became of them he could not ascertain. The solution of the puzzle remained for MacCallum. His studies, carried out in America on the blood of crows affected with the malarial parasite, *Halter-*

idium, showed him two forms of parasite, one granular and staining deeply in methylene blue, the other hyaline and staining less deeply. The changes undergone by these take place in the hanging-drop of blood or serum, and can be, therefore, readily followed. From the hyaline individuals are produced with remarkable suddenness several flagella which detach themselves, wriggle towards the granular forms, and ultimately penetrate into them.

The parasites of human malaria have since been seen by numerous observers to go through a similar series of changes, and the meaning of the process is now universally acknowledged. It is an act of fertilisation comparable with that which underlies sexual reproduction in the higher animals. The crescent-shaped malarial parasite is a form preparatory to the sexual process. In the stomach of the mosquito the crescents become spheres, and some of them have a granular appearance. This is the *Macrogamete*, or female cell homologous with the ovum of the higher animals. Other spheres are smaller and hyaline. These are the *Microgametocytes*, homologous with the epithelial cell of the testicular tubule of the vertebrates. The "flagella," so-called, are the micro-gametes, the homologues of the spermatozoa. The fertilised female individual does not, however, at once become encysted as amongst the Coccidia, but it assumes an elongated form not unlike a little worm, the *Zygote* or *Ookinet* according to Schaudinn's nomenclature. It bores its way into a cell of the lining epithelium of the digestive tube of the mosquito. Soon it reaches the cœlomic aspect of the bowel, its movements cease, it increases vastly in size, its shape becomes spherical, a thick capsule develops round it, and it becomes, in fact, an *oocyst*. Its nucleus meanwhile divides repeatedly, and the protoplasm arranges itself round each daughter nucleus. These initial products of

cell-division are the *sporoblasts*. They again divide up into minute rod-like cells, the *sporozoïtes*, which become collected in the proboscis, possibly by virtue of some chemotactic influence exerted by the insect's saliva. They are then ready for introduction into the human subject. [*These stages in the developmental cycle were illustrated by lantern slides.*]

We are now in a position to compare the two-fold developmental cycle of the malarial organism with that of the Coccidia, and thus bring the former into line with what is known of other *Sporozoa*. To begin with, the rod-like Sporozoïte in the proboscis of the mosquito is, of course, homologous with any one of the 8 "sickle-germs" developed in the mature Coccidium (*oocyst*) evacuated from the intestine of the rabbit. When introduced into a fresh host—the malarial parasite, through the agency of the mosquito, the *Coccidium* passively, with the food—there ensue a number of asexual generations usually termed reproduction by sporulation. This is what Koch styles the "endogenous," and Schaudinn, more appropriately, the "schizogenous" stage of development. The mature parasite divides into segments called Merozoïtes, assuming, in the case of Coccidium, a shape like that of an orange, falling asunder into its constituent carpels, whilst the sporulating malarial parasite becomes rosette-shaped. The continuous repetition of this process brings about a very thorough infection of the host-animal, the biliary and intestinal epithelium being the seat of the disease in the one case, and the red blood-discs in the other. Toxæmia and death may be the result of this intense infection. Should this not occur, a reaction takes place in favour of the host-animal. The parasites, incommoded, perhaps, by the accumulation of their own metabolic products, or by antitoxin, or finding their *pabulum* exhausted, or per-

haps assailed by some drug (quinine), make their preparations for escape to "fresh fields and pastures new." The asexual reproduction gradually ceases and sexual differentiation occurs. In the case of the Coccidium, fertilisation takes place within the body of the animal which has served as host to the asexual generations. In the case of malaria, although the preliminary changes—viz., the formation of crescents, can take place within the vertebrate host, the full evolution of the sexual elements does not occur until they have passed out into the stomach of the blood-sucking invertebrate host. The ripe *Oocyst* of the Coccidium reaches the outer world in the fæces of the host animal, and thus undergoes segmentation into four thick-walled spores, each of which divides again into two sporozoïtes, which are liberated only when the spore is swallowed by a fresh animal. In the malarial parasite the *Oocyst* ripens in the interior of the cold-blooded invertebrate host, and breaks up into a seemingly indefinite number of *Sporoblasts*, which do not become encapsulated but divide directly into numerous needle-shaped spores. Through these resemblances and these differences we see the same fundamental ground-plan, and can now readily appreciate why it is that these two groups of organisms—the Coccidia and the malarial parasites—mutually explain and illustrate each other.

It would, no doubt, be interesting to many of my hearers were I to give some account of the other orders of the Sporozoa, the Myxosporidia, which attack fishes, the Micro-sporidia, of which the leading species causes a disease of the silk-worm known in France as Pébrine, and the Sarcosporidia, which, in the form of sausage-shaped tubes filled with crooked spores, have long been known to occur in the muscle fibres of the sheep's œsophagus, where they were originally described by Rainey and

Miescher in the middle of last century. But this exposition has already overstepped its preconceived limits and those of your patience, I fear, also. I shall, therefore, now proceed to give some account of the remaining species of Protozoa which are known to produce disease.

The leading parasites belonging to the class of Flagellata are the species of Herpetomonas, commonly spoken of at present as *Trypanosoma*. They are somewhat fish-like organisms, about 20 or 30 μ long, provided along one side with a thin vibratile, or so-called "undulating" membrane, which ends in a long flagellum. Their connection with disease in the lower animals was first established by Griffith Evans so far back as 1880. He found them in the blood of horses, mules, and camels in India that were affected with a sort of pernicious anæmia, locally called "Surra," and succeeded in demonstrating, by inoculation experiments, their ætiological relation to the disease. The parasite of Surra has consequently been called Trypanosoma Evansii.

In the warmer parts of Africa, along river valleys, and near the sea, there rages a destructive malady chiefly of transport animals (horse, ass, mule, and ox), but also affecting dogs and cats, called in Zululand *Nagana*. The earlier travellers in these regions noticed—what had long been known to the natives—that it came on after the affected animal had been bitten by a species of dipterous fly, somewhat larger than the common house-fly, and of a yellowish hue. It is locally known as the *Tse-tse*, and now generally identified with *Glossina morsitans* (Wedgwood). The frightful ravages of this fly, its loud buzz, and venomous attacks on domestic animals, and even on man, have been painted in lurid colours by Livingstone and other travellers. The cause of the fatal result that so often and so rapidly ensues in susceptible animals as the

consequence of the bite of this insect, has long been suspected to be either some toxic material or some form of parasite inoculated by its proboscis. The latter suspicion was proved to be correct by the painstaking and convincing labours of Dr. Bruce, published in 1895, and more completely in 1897 (Harrison, London). He showed that the Nagana is due to a *Trypanosoma* which is taken up by the fly somehow and inoculated by it into the domesticated animals, the blood of which it sucks. Bruce found the parasite in the blood of several kinds of local wild animals (mostly Ungulates, and in one hyena—a Carnivore), so that it is probable that the fly obtains its contained parasite from this source. The wild animals do not seem to suffer much from the parasite. Whilst continuing to harbour it they enjoy in all probability a certain immunity. But the results of the inoculation of the smallest trace of infected blood on domesticated animals of recent introduction into a fly-stricken district are disastrous. Unlike the malarial parasite, the Trypanosoma does not undergo any developmental cycle in the fly, which therefore cannot be properly termed an "intermediate host." Indeed, should the fly, once charged with infected blood, fail to get a speedy opportunity of biting a fresh animal, the parasites die out. After a few days the disease caused by the bite only develops after a much lengthened incubation period, whilst 140 hours after the fly becomes infected its contained parasites are all motionless, and appear to be dead. The bite has then no result. For these facts of capital importance we are indebted to the perseverance and acumen of David Bruce. Through the kindness of the late Professor Kanthack, who, together with Drs. Plimmer and Bradford, has experimented with this parasite, as well as to that of Professor G. H. F. Nuttall, of Cambridge, I am enabled to show preparations of guinea-

pigs' blood containing the parasites. Whether or no this Tse-tse Trypanosoma is identical with that of Surra I cannot say. Koch in his well-known *Reiseberichte* regards them for the time being as identical, but I have seen no statement as to how the Surra-parasite is conveyed from one animal to another, and this seems to point to a difference. Propagation by fly-bites could hardly fail to have been observed in India if it took place there.

Those who wish to observe the living Trypanosoma have only to examine the blood of the common wild rat (sewer rat). In most European countries the rat has been found to harbour this parasite, and I decided to ascertain whether this was the case in Ireland also. Through the kindness of the authorities of the Royal Zoological Gardens, Phœnix Park, I have been enabled to examine the blood of a number of rats caught in the stables and kept alive for the purpose. In seven out of fifteen I found the parasite, often so abundantly that the blood might be said to swarm with them. I have brought down one of these animals and now exhibit a fresh preparation of the blood, showing several of the fish-like parasites lashing about and causing a commotion amongst the red corpuscles. I have also made stained film preparations by the Romanowsky method, and now demonstrate one showing the anterior and posterior chromatin masses (macro- and micro-nuclei of some authors) as well as the flagellum and edge of the undulating membrane stained red, whilst the rest of the parasite is blue.

The reproduction of *Trypanosoma* takes place asexually by a process of longitudinal splitting, preceded by the (apparently) amitotic division of the nuclei and flagellum. Not infrequently the parasite increases greatly in size, and forms, by radial creasing, a sort of rosette, each segment of which possesses its own flagellum and pair of

nuclei, and finally becomes detached. In the preparations I made of the blood of infected rats I found both the double and the multiple division forms to be fairly numerous. The details of the process are of great cytological interest, and have been carefully worked out by Rabinowitsch and Kempner (*Ztschr. f. Hyg.*, Vol. 30), by Wasielewsky and Senn (*ibid.*, Vol. 33) and by Mesnil (*Annales Pasteur*, 1901), to whose papers I must refer those who desire further information. The last-named writer has succeeded in producing a serum capable of agglutinating the Trypanosoma—the first instance, so far as I am aware, of the production of an anti-body specific for a Protozoal parasite.

For the reason stated at the commencement of this paper I pass over the fourth or highest class of Protozoa, the Infusoria, in silence, and, strictly speaking, this exposition should now terminate. But there remain two interesting topics, without reference to which an attempt to give an idea of the subject would remain confessedly incomplete. The first of these is Texas Fever, which is admittedly due to a protozoal parasite, the exact position of which is still uncertain, but which is probably allied to the malarial parasite. The second deals with the *Cytoryctes Vaccinæ*, to which vaccinia and small-pox are, with increasing probability, being ascribed by a growing number of investigators, but the parasitic nature, and indeed the actual existence of which is still called by many in question.

The infectious hæmoglobinuria of cattle, otherwise known as Red-water or Texas Fever, and in Ireland as "blood-murrain," was shown by Theobald Smith and Kilborne in 1892 to be due to a very minute pear-shaped parasite living in the interior of the red blood corpuscles, as well as in certain of the viscera, especially the kidney.

Passing over the many interesting facts connected with the morbid anatomy and distribution of the disease that have been since accumulated, and the general tendency of which is to show that "red-water" may be looked upon as the malaria of Ungulate animals, I come at once to the main fact, long suspected by cattle breeders and ranchemen in the warmest parts of the United States, but first proved by Smith and Kilborne—viz., that the disease is propagated by ticks. These 8-legged, blood-sucking parasites (*Ixodes bovis*), belonging to the group of the Arachnoids, bury their proboscis in the skin of the ox, and continue to suck its blood for many days. During this time fertilisation takes place, the minute male parasite dies, and the fertilised female, swollen to the utmost with blood, drops off, and matures her ova on the ground, unable to move owing to the huge size of her body. The eggs are laid, and they hatch out in about three or four weeks, producing a brood of very small and very active larval ticks, which run about the grass seeking for an ox. Having found one, they attach themselves, bury their proboscis in its skin, and commence to suck the blood. *Should the young ticks be the offspring of parents that lived on an ox affected with Red-water*, the disease makes its appearance about ten days after the young ticks have commenced to bite. Koch confirmed this remarkable statement of Smith's. We have here the unique phenomenon of a disease being propagated not by the invertebrate host that actually sucked the blood, as in the case of malaria, but by its progeny. How the parasite passes from the mother tick to its offspring has not been definitely determined. Attempts to reproduce the disease by injecting pulped ova and larval ticks have failed. The parasite is so small that it is very difficult to identify microscopically amongst the granules of various sorts that

abound in the eggs and embryos of the tick. Conceivably the infection of the young tick may not be of germinal origin, but may be due to a contamination of its outer skin with parasites from the surface of the as yet unhatched eggs amongst which it runs about. Failure to produce the disease on subcutaneous inoculation of presumably infected eggs or embryo-ticks may with some probability be accounted for by supposing that the parasite requires for its successful inoculation the presence in the inoculation wound of some favourable or protective substance, such as the saliva of the tick. That some irritating substance is introduced by the tick-bite seems certain from the fact that an intense inflammatory small-cell infiltration occurs at the bitten place. Under cover of such a substance the early developmental stages of the freshly inoculated parasite are, very probably, passed, and general infection of the ox then ensues. Injected by a hypodermic needle, without the protection afforded by the secretion of the tick, the parasite falls a victim to the natural defensive mechanisms. Such would be, at any rate, one explanation of the facts as we find them.

The parasite is a pear-shaped, sometimes club-like, or even discoid mass of amœboid protoplasm, about the size of that of human tropical malaria. Two are often present in the one red corpuscle, hence the name given to it by its discoverers—*Pirosoma*[a] *bigeminum* (Sm. and K.). My friend, Professor Mettam, Principal of the Royal Veterinary College, has made the interesting observation that this parasite exists in Ireland, and through his courtesy I am enabled to show some demonstrative preparations. [*Demonstration.*]

The question of Vaccinia and its ætiology is one of

[a] Now altered in accordance with the law of biological nomenclature to *Piroplasma.*

absorbing interest at present. The main facts are these: Bacteria are numerous in the vaccine crusts of the calf, and efforts have been made by, amongst others, Besser, Klein, Copeman, Stanley Kent, Vanselow and Czaplewski (*Centralbl. f. Bakt.*, Vol XXV., 1889), Nakanishi (*ibid.*, Vol. XXVII.), and others to demonstrate a causal relation between one or other of these bacteria and the vaccine process. These efforts have been unsuccessful. Other observers have adopted the view that a protozoal parasite is at work, and one of the earliest and most industrious workers at parasitic Protozoa—L. Pfeiffer, of Weimar—took this view more than ten years ago, and claimed to have demonstrated an amœboid parasite in humanised and calf lymph, as well as in the contents of the variolous pustule. In 1892 Guarnieri, of Pisa, came forward with a paper based on the examination of the inoculated rabbit-cornea. By selecting this locality he was able to observe the histological effects of vaccination uncomplicated by the vascular phenomena of inflammation. In the epithelial cells of the cornea he found peculiarly staining bodies, varying from the size of a micrococcus to about half that of an epithelial nucleus. He considered that he had demonstrated amœboid movement and reproduction processes in these bodies, and founded for them a new genus and species of Protozoa, to which he gave the name of *Cytoryctes vaccinæ*. I cannot at this late hour discuss the voluminous literature that has since sprung up. Some observers look upon the Guarnieri bodies as mere fragmented and hyperchromatic nuclei of wandering leucocytes (Salmon, *Ann. Pasteur*, 1897). Others consider that similar bodies can be produced by all sorts of irritants applied to the cornea, and that they are in no wise specific to vaccinia (Ferroni and Massari, *Riforma Medica*, 1893, and *Bulletin dell' Accademia, Catania*, 1895). One of the most painstaking workers in this field—Armand

Hückel—has been led to the view that though not the actual parasite, the bodies are the products or results of its presence. Dr. Gustav Mann, of Oxford, who has published in the Supplement to the 28th Annual Report of the Medical Officer of the English Local Government Board a very full description of the histology of the vaccine process, has failed to convince himself that the Guarnieri bodies stand in a causal relation to that process. The opposite view is held by v. Wasielewsky, one of Pfeiffer's pupils. As the result of a thoroughgoing experimental inquiry (*Zt. f. Hyg.*, Vol. 30) he has come to the conclusion that the bodies described by Guarnieri are really parasites and the cause of vaccinia. He has cultivated them through forty-three generations on the rabbit's cornea, failed to produce them with inactive lymph, and never missed them when he used a vaccinially active material. [Since writing the foregoing lines I have learnt that Guarnieri has within the last few weeks (December, 1901) claimed to have cultivated his parasite by means of the collodion-sac method, in the peritoneum of rabbits.]

Through the kindness of Dr. Gustav Mann I am enabled to show some of his beautiful preparations illustrative of the various stages of the development of the vaccine vesicle in the calf. In some of them, Guarnieri bodies can readily be made out [demonstration]. It now only remains for me to thank the Section for the patience with which they have listened to this prolonged exposition.

ZONULAR CATARACT.

By J. B. STORY, F.R.C.S.;
Surgeon to St. Mark's Ophthalmic Hospital;
Professor of Ophthalmic and Aural Surgery, R.C.S.

[Read in the Section of Pathology, November 29, 1901.]

THE cataract exhibited was removed from the eye of a man, aged forty, by a simple extraction without iridectomy. A similar cataract had been removed from the other eye a few weeks earlier, but the lens was too much injured in the extraction to admit of satisfactory sections of the cataract. The sections of the present case, kindly made by Dr. Earl, show perfectly the changes in the lens, which have been described by other observers—viz., Lawford and Schirmer, and though they do not add anything that is not already known to our knowledge of zonular cataract, I think the case is worth record as corroborating what has been observed by others.

This peculiar affection of the crystalline lens has long been known to ophthalmic surgeons, but the first exact anatomical description of it was made by E. v. Jaegar in 1854. We learn from an observation made by Hulke in the Transactions of the Ophthalmological Society in 1890, that Bowman demonstrated the lesion in a cat in 1846, but this demonstration was never published. V. Graefe described the affection in 1855, and from that time till very recently no important addition was made to our knowledge of the anatomical condition of the lens in zonular cataract, although a great many interesting observations were made upon the clinical history, and several ingenious theories advanced to account for its causation. The affection may be described as a partial opacity of the lens implicating only a zone or rather sphere of fibres

lying between the centre and the periphery, so that the cortex is transparent, and also the nucleus, but the latter is separated all round from the clear cortex by a spherical layer of opacity. The volume of the lens is less than that of the normal lens of same age. The condition is nearly always bilateral, and often congenital, though it has been known to form after birth, and there may be several separate zones of opacity, so that the lens is a sort of sandwich of transparent and semi-opaque layers from periphery to centre.

The above sums up all that was known on the subject till Arlt made the observation that the subjects of this form of cataract very frequently suffered from convulsions in infancy, and he put forward the theory that in the convulsions some lesion was produced at the junction of the harder central portion with the softer peripheral portion of the lens. This connection with convulsions was confirmed by Horner, of Zurich, who observed also that the affected children exhibited many signs of rickets, in their teeth, skulls, and skeletons, and were often of imperfect mental development. The dental deformities described by Horner are exactly the same as those attributed by Jonathan Hutchinson to the action of mercury in infancy. The sequence would then be convulsions, calomel, stomatitis, and deformed teeth.

After Horner's observations the theory advanced by Arlt was generally abandoned, and the views of Horner accepted, which may be stated as follows:—A temporary derangement of nutrition affecting the whole organism, generally of the nature of rickets, produces defects in the young growing fibres of the lens without affecting the older central fibres, and as new transparent fibres are formed subsequently external to the opaque zone, the result is a zonular cataract. The peculiar dental defects are accounted for by the similarity of the development of the enamel organ to that of the crystalline lens.

From the time of Horner's publication till a very short time ago it was generally accepted that the nucleus of the lens is normal in zonular cataract, but Beselin discovered that this is not the case, and that the nucleus exhibits numerous minute vacuoles which he indeed erroneously regarded as *post-mortem* changes. Between the nucleus and the periphery he found a cleft filled with granular material, and this he considered to be the actual cataract seen *intra vitam*. He attributed the cataract to a shrinking of the nucleus which caused a separation between it and the cortex. The novel point in Beselin's description is the implication of the nucleus, and this has been corroborated by nearly, if not quite all the subsequent observers, including myself; but it has been shown conclusively by Schirmer that the cleft observed is not the cataractous zone, which is itself also formed by vacuoles. My case entirely agrees with those of Schirmer, and I think a study of the photographs of Lawford's case in the Ophthalmic Hospital Reports, Vol. XII., p. 184, will convince anyone that the opacity in his case, too, is formed by a layer of vacuoles at the outer border of the nucleus.

It may be admitted as a generally accepted fact that there are pathological changes in the whole lens substance interior to the zone of cataract, and that this opacity is caused by a dense agglomeration of the same vacuoles which are found more sparsely in the apparently clear nucleus. The most satisfactory explanation of this anatomical condition is, I think, that of Schirmer, which is in essentials the old theory of Horner adapted to our present knowledge. It may be stated thus: Some temporary lesion of nutrition affects the entire crystalline lens and produces vacuoles among the fibres, but these changes are only sufficiently marked in the youngest fibres to produce a definite clinical opacity, and this is the zonular cataract. If the whole lens nucleus and cortex happens to be pretty nearly equally affected we have a

stationary central cataract, which may be looked upon as a sort of imperfect zonular cataract. The shrinking of the nucleus produces clefts which appear as the well-known "outriders" seen in these cataracts, and to the same cause is due the diminished size of the lens in these cases.

There are certain difficulties, however, in this theory, which have not yet been cleared up. One is the unproved assumption that every zonular cataract must begin as a total cataract, though a cataract of but slight saturation. Now, no observer has described the change of an infantile total cataract into a zonular cataract by addition of clear lens fibres to its outside, and if this was really a common occurrence someone should have seen it. Again, the measurements made by Dub are not easily reconciled with this theory. In ten cases of bilateral and quite symmetrical zonular cataracts between the ages of 8 and 24 he found the diameter of the cataracts varied from 4·4 to 5·6 mm.

The average diameter of the lens (equatorial) he found to be 7·46 mm. in children under one year, and 7·87 mm. in children under two years. Treacher Collins found the lens of the seven months fœtus to have a diameter of 5 mm., and that of the nine months fœtus a diameter of 5·75 mm. This makes it very difficult to believe that zonular cataract, if it implicates the whole lens existing at the time, can arise in the first or second year of life, when the convulsions, rickets, &c., present themselves, for the diameter of the lens is then already greater than that of any cataract measured by Dub.

Our theory may be brought into harmony with these observations by one of three hypotheses:—

1. That the lenticular lesion dates from an early period of intra-uterine life when the lens is hardly larger than the resulting cataract.

2. That there is in these lenses an abnormal rapidity of the nuclear shrinking that is constantly going on in all lenses.

3. That the cataract originates after birth, but that the lesion affects only a portion and not the whole of the lens then existing.

This third hypothesis brings us back to the old theory of Arlt. It is advocated by Peters, but appears to me more improbable than either of the other hypotheses. The argument that no one has observed the development of a zonular cataract out of a purely peripheral opacity is not convincing. The opacity while in contact with the capsule may be so faint as not to be noticed, or if dense will be regarded as a total cataract and operated on accordingly.

CASE OF SARCOMA OF KNEE (ACUTE TRAUMATIC MALIGNANCY); AMPUTATION AT HIP-JOINT; RECOVERY.

By HENRY GRAY CROLY,

Senior Surgeon to the Royal City of Dublin Hospital; Consulting Surgeon to the Monkstown Hospital.

[Read in the Section of Pathology, November 29, 1901.]

MRS. J., aged fifty years, got a kick from a cow in the left knee, causing a large pyriform tumour involving the lower two-thirds of the left femur—base downwards—elastic to the touch. On section the substance resembled brain matter in colour and appearance, and was dotted over with puncta resembling the vascular spots upon the brain substance. It was friable and difficult to manipulate—the stroma being delicate. Under the microscope could be seen long spindle-cells, separated by a delicate stroma, the whole studded by channels tunnelled in the substance of the tumour. In some, blood clots remained; in others, they had been washed out. Cells were young and active, easily stained, and their proportion to the stroma pointed to an increasing malignancy.

Dr. G. B. White very kindly examined specimens of the tumour, which were exhibited at the Section of Pathology.

ON THE PRESENT STATE OF OUR KNOWLEDGE AS TO THE ÆTIOLOGY OF VACCINIA.

By E. J. McWEENEY, M.A., M.D. (R.U.I.); D.P.H.; M.R.C.P.I.;
Professor of Pathology and Bacteriology in the Medical School of the Catholic University, Dublin;
Bacteriologist to the Local Government Board for Ireland.

[Read in the Section of Pathology, January 10, 1902.]

When I received my present appointment at the Local Government Board, and was entrusted with the supervision and control of the calf lymph supplied by Government to vaccinators throughout the country, my close attention was very naturally called to the question as to the nature of the virus of vaccinia, and its relationship to that of small-pox.

It is impossible for anyone who has familiarised himself with the methods of investigation whereby so many obscure problems in the causation of infectious disease have been cleared up to stand idly by and witness week after week the vaccination of the calf and the regular appearance of the outcrop of pustules, without seeking to learn something as to the cause of the phenomenon. Again, the fact that inoculation with this calf-derived material confers upon the human subject immunity against what at first sight would seem to be quite a different and more deadly malady—the much-dreaded small-pox—is one that runs counter to our latter-day conceptions as to the specificity of the *materies morbi* in each one of the infective diseases.

Furthermore, there was the reflection that the discovery of protection so conferred against a seemingly different malady was merely empirical—the result of a happy chance, and not founded on any deep knowledge of the real conditions. Yet the immunity conferred by vaccination exceeds in certainty

and duration any similar condition produced in the human subject as the result of accurate knowledge during the bacteriological epoch. That the exciting cause must be a micro-organism seems, from analogy, to be quite certain. We know of nothing else that, introduced into the animal economy in infinitesimal quantity, is at the end of a definite period present in incalculably larger amount, and then quickly disappears, leaving behind it a persistent and profound alteration of the system which enables us to approach unscathed one of the deadliest of infections.

That the discovery of the micro-organism must be a matter of much difficulty was evident from the numerous alleged discoveries that have been made from time to time, only to be disproved by others or admitted by the would-be discoverer himself to be premature and unfounded. Still, there was the phenomenon, and there was I acquainted with the methods of research. The cause must be a micro-organism. It must be in the tissue of the vaccinated area. If not cultivable, it may at any rate be demonstrable by histological methods. Then why not look for it? Were it easy to find it would have been found long ago. Hence the search was not to be lightly undertaken. In order to find a passage through this maze, where so many had already lost themselves, it would clearly be necessary to find out how much of the ground had already been explored, what avenues had already been followed up and found to lead nowhere, what untraced paths there still remained which held out fair promise of success.

So much I have now accomplished, and my object to-night is to lay before the Section a brief statement of the present state of the question at issue.

First, why does cow-pox give immunity against small-pox? Because the two diseases are caused by the same virus, which, occurring naturally in man, produces variola, but which, by passage through the system of the bovine animal, undergoes

attenuation, so that when re-inoculated on the human subject the effect is no longer a generalised pustular eruption but a single vesicle limited to the seat of inoculation.

By passage through the calf a thorough change in the character of the virus must take place, for it loses its power of convection through the air, and loses its infectivity save by inoculation.

Many investigators have succeeded in variolating the cow—*i.e.*, in producing on that animal an eruption by inoculation with the contents of variolous pustules. The first of these seems to have been Gassner, so far back as 1807. In 1839 von Thiele repeated the experiment with success. Having obtained material from human small-pox, he inoculated it on the udders of calves, and so obtained a vesicular eruption which he continued from calf to calf for 75 generations. Meanwhile he vaccinated no less than 3,000 individuals from the same strain with typical results.

In England, Ceely, about the middle of last century, demonstrated conclusively the inoculability of human small-pox on the cow, and the transmissibility of the virus from cow to cow, the identity of the eruption so produced with natural vaccinia, and the immunity against small-pox produced by the inoculation of man with variolo-vaccine so produced. Since Ceely's time his results have been abundantly confirmed by the successful variolations of the cow at the hands of Voigt, Fischer, and others.

With the exception of the French school, headed by Chauveau, which holds that the two diseases are absolutely distinct, and fails to give any adequate explanation of their mutually protective power, their identity is now admitted by all competent to form an opinion on the subject.

Whoever discovers the microbic agent in vaccinia will, therefore, have also discovered that of small-pox.

In order to discover the micro-organism one would naturally

examine the tissues which are presumably altered as the result of its presence—the parasite, in the case of small-pox, being deposited apparently from the blood, and in that of vaccinia being directly implanted by human agency. Weigert seems to have been the first, in 1874, to make an accurate examination of the minute anatomy of the skin lesion in small-pox, and a few years afterwards Unna published some valuable works on the same subject.

Quite recently a most careful and complete investigation of the histology of the vaccine vesicle has been made by Dr. Gustav Mann, of the Physiological Laboratory, Oxford, and published by him in the Supplement to the Ninety-eighth Annual Report of the Local Government Board for 1898–99.

This investigation was carried out on carefully fixed material, collected by Dr. Copeman from the vaccinated calf, and representing every stage of the vaccine process, from the first hour to the tenth day. The methods are those of the most advanced histological technique, and the results are set forth in a series of beautiful photographs—some from drawings made carefully to scale, some from the actual preparations. Through the kindness of Dr. Mann, I am in a position to show some of his results by means of lantern slides and preparations, for the loan of which I am greatly indebted to him.

[DEMONSTRATION.]

The search for the specific vaccine organism has gone along two paths—search for a bacterium; search for a protozöon.

First, as regards bacteria; absolutely fresh lymph from an aseptically opened vesicle on the arm of a child is bacteriologically sterile; as collected under ordinary circumstances it contains cocci. Calf lymph always seems to contain cocci. Over 50 different kinds—staphylo-, strepto-, in fact every variety—of cocci have been found in vaccine lymph.

The irritating nature of calf lymph is erroneously ascribed

to these cocci. Lymph very rich in cocci was found by the German Lymph Association to exercise in many cases no irritating effect, and to be devoid of vaccine power. Active lymph causing a vigorous local reaction was often found by them to be sterile.

The cause of the process cannot, therefore, lie in the presence of cultivable cocci, and all attempts to establish these as producers of the malady have failed. The latest attempt is Czaplewski and Vanselow's *Micrococcus quadrigeminus*. The same holds good of the bacilli that have from time to time been described as the morbific agents.

Unsuccessful attempts to demonstrate a bacillary etiology were made by Klein, Copeman and Kent in 1892–94.

The latest is Nakanishi's attempt to make out that the "Xerous" bacillus is the cause of the disease.

Protozoal Ætiology.—Bacteria having proved impotent, and Chauveau, Braidwood, and Vacher having shown that lymph freed from its corpuscular elements by filtration or diffusion is deprived also of its vaccine powers, nothing remained but protozoa, and the first author who seems to have recognised amœbæ in vaccine lymph is Van der Loeff, in 1887 (*Monatschr. f. prat. Dermat.*, 1887). In small-pox vesicles he found similar organisms. Independently of Van der Loeff, L. Pfeiffer, the head of the Government Vaccine Department at Weimar, and the founder of an influential school of thought tending to give prominence to the protozoa as producers of disease in man and the lower animals, came forward about the same time (*Korrespondenzbl. d. ärtz. Vereins in Thüringen*, 1887, No. 2) with the discovery of a protozoal parasite which passed its early developmental shape in the epidermal epithelium. He describes it as forming spores within a capsule, and classed it with the sporozoa. He gave it the name of *Monocystis epithelialis*. Its spores were, he considered, present in humanised

and calf lymph, but with our existing optical methods were not distinguishable from cocci.

Whatever be thought of Pfeiffer's organism, he deserves the credit for being the first to make the important step of regarding the vaccine process as an epithelial infection.

Guarnieri, in 1892, made the next step in advance by selecting as the seat of his experimental inoculations the front of the rabbit's cornea, and thereby doing away with the vascular and leucocytic phenomena evoked by the irritation of the parasite, and so powerfully tending to obscure the real nature of the phenomena.

Leucocytes take two or three days to reach the centre of the inoculated cornea, and during that period the intimate features of the vaccine process can be watched in their absolute purity. The inoculation is performed with great ease after a little practice. A fine needle dipped in active sterile lymph is entered obliquely near the centre of the cornea, so as to penetrate to a very slight extent between the epithelial cells. On no account is a deep thrust to be made or the anterior chambers to be perforated. When the operation is properly performed there is no alteration whatever in the appearance of the eye for 24 hours. On careful observation the epithelium is then seen to be very slightly thickened, and this thickening extends for 2 or 3 mm. round the point of inoculation. Even at the end of 50 or 60 hours there is no opacity, but the central elevation is seen to be surrounded with small transparent projections.

After the third day, ulceration, with local turbidity, sets in, and may spread to the lamellar part and perforate into the anterior chamber, causing hypopion. If the animal is not killed the process gradually terminates, leaving a central leucoma.

If the rabbit is killed towards the end of the second day, before either leucocytes or cocci have arrived on the scene,

and the cornea excised and fixed in sublimate, each cell of the deeper layer of corneal epithelium at the point of inoculation is seen to contain a small, round body, lying beside the nucleus, and, roughly, about half the size of it. The body lies in a clear area or vacuole in the protoplasm, and not unfrequently depresses and bulges in the nuclear membrane. Guarnieri considered these "bodies" to be genuine parasites belonging to the protozoa. Shavings of the cornea teased out in aqueous humour and examined on the warm stage revealed the "bodies" performing amœboid movements. The "bodies" stained well with hæmatoxylin, carmine, and the basic anilines. A nucleus could be made out, and, finally, Guarnieri considered that he had discovered two modes in which these bodies reproduce themselves—one by direct division into two parts, the other by segmentation, so as to form a mass something like a blackberry or morula. The actual division into segments and infection of fresh epithelial cells by the young amœbæ were not observed. Pfeiffer recognised in Guarnieri's sporulating form his own *Monocystis epithelialis*, and the parasitic nature of Guarnieri's bodies was fully admitted by many of those who saw his preparations at the International Medical Congress in Rome in 1894.

Amongst English pathologists, Ruffer, Plimmer and Jackson Clarke expressed their full agreement with Guarnieri's contention. Many others, however, who saw the bodies denied the validity of Guarnieri's interpretation of them, and a great deal of experimental work has since been done, the outcome of which I shall endeavour very briefly to lay before the Section. Some* took the view that irritation of the cornea with various substances, such as croton oil, osmium, or Indian ink, could produce intracellular "bodies" such as Guarnieri described. Salmon, working in the Pasteur Institute, convinced himself, as the result of careful staining, that the supposed parasite

* Massari and Ferroni, 1893.

was nothing but the hyperchromatic residue of the nucleus of a broken down, wandering leucocyte. Hückel, in 1898, made a most careful and exhaustive study of the inoculated rabbit's cornea by modern histological methods, and came to the conclusion that the parasitic nature of the bodies was not proven. He looked upon them as a specific degeneration of the cytoplasm of the epithelial cells, brought about by the presence of the as yet undemonstrated parasite. Gustav Mann, whilst unable to satisfy himself as to their origin, is also convinced that these bodies are not parasites. On the other hand, L. Pfeiffer repeated Guarnieri's work, and convinced himself that chemical irritants were unable to produce anything resembling the specific "bodies" in the corneal epithelium. Von Sicherer also confirmed Guarnieri in 1898, but a more important contribution was made by Ernst Pfeiffer in 1895 (*Centralblatt für Bakt.*), who saw from the first to the eighth hour after vaccination the bodies lying *between* the cells of the corneal epithelium. From the eighth to the tenth hour he saw very minute ones penetrating into the epithelial cells, approach the nucleus, become surrounded by a somewhat clear area, and even by a sort of radiation in the encircling cytoplasm. He also saw them producing a depression of the nuclear membrane. He made the further important observation that filtered lymph, or lymph that has lost its power, does not, on corneal inoculation, give rise to the formation of "bodies." Finally, he showed that shavings of the infected epithelium from the rabbit's eye, if introduced into the cornea of other animals, produced similar changes, and that, after several such passages from eye to eye, a calf could be successfully vaccinated from the scrapings of such an eye and the lymph used for vaccinating children.

In 1896, v. Wasielewsky, a pupil of L. Pfeiffer, took up the subject energetically, and undertook to solve the following questions :—

1. Can one keep on indefinitely producing the characteristic changes in the rabbit's cornea by serial inoculations? and

2. Does the specific character of the process as tested on calves and children persist along the whole length of such a series of rabbits' corneas?

Both of these questions he answered—as the result of his patient work—in the affirmative.

He kept on inoculating from rabbit cornea to rabbit cornea, always reproducing the specific "bodies." In one series he re-inoculated every second or third day, in another every fourth or sixth day, always with the same result. He sometimes inoculated both eyes of the animal, using one for the microscopic examination, the other for re-inoculation. Some times he inoculated the same cornea in two places, and used one for each purpose. Sometimes, as a more crucial test, and with the expertness begotten of long practice, he detached the little kernel of swollen epithelium from the front of the cornea with a sterile lancet, placed it on a sterile slide, and divided it in two parts, one of which he used for re-inoculation, whilst he sought for "bodies" in the other. With rabbit corneas of the sixteenth and also of the twenty-fifth generations calves were successfully vaccinated, and, after the termination of the process, were tested with active calf lymph, and found to be immune. The lymph obtained from the calf vaccinated with the cornea of the twenty-fifth generation was used for vaccinating children with typical results.

The corneal epithelium of three rabbits belonging to the forty-sixth generation was mixed up with glycerine, tubed and taken to the vaccine institute, where it was used three hours later for vaccinating seven children, six insertions being made in each case. The result in a week was:—

1 child had no vesicle.
2 children had 1 vesicle.
1 child had 4 vesicles.

2 children had 3 vesicle-.
1 child had 6 vesicles.

The vesicles were perfectly typical.

The remainder of the same epithelium was microscopically examined and found to contain the typical "bodies."

When a specific property in this case—that of producing typical vaccinia—can be transmitted through an indefinite number of generations in certain cells, and when these cells are found to differ from normal cells in a certain respect only—viz., the possession of certain "bodies"—one is certainly justified in holding that the presence of these bodies is ætiologically related to the vaccinial activity of the cells in which they are contained.

My own conviction is that the solution of the question as to the causation of small-pox and vaccinia is indissolubly bound up with the interpretation of the "bodies," whether we look upon them with Hückel as merely the effect of the presence of the (invisible) parasite, or with Guarnieri as the actual protozoan parasite, the producer of an "epithelial infection."

We shall not have to wait long—if I may venture on a prediction—for the settlement of this question. I now conclude by showing some photographs of these "bodies" on the screen.

[DEMONSTRATION.]

DR. A. N. MONTGOMERY held that we never had a vaccine pustule—the pustule was the result of want of cleanliness. Pure lymph gives vesicles only. He would like to hear from Dr. McWeeney if he had ever found these Guarnieri bodies in lymph supplied to the Cow-pock Institution? Could these bodies be cultivated and vaccination be produced from the cultures?

DR. MCWEENEY declared he was at one with Dr. Montgomery in saying that pure lymph never produces a pustule. He had not as yet commenced a systematic search for the bodies.

ON A LARGE BLOOD-CYST OF THE LESSER PERITONEAL CAVITY.

By E. J. McWEENEY, M.A., M.D. (R.U.I.); D.P.H.; M.R.C.P.I.

Professor of Pathology and Bacteriology in the Medical School of the Catholic University, Dublin;

Bacteriologist to the Local Government Board for Ireland.

[Read in the Section of Pathology, January 10, 1902.]

THE patient, a female, M. M., aged thirty-eight years, unmarried, was admitted into the Mater Misericordiæ Hospital on the 3rd Sept., 1901. The clinical history is unfortunately imperfect, and the only facts now obtainable are that the patient had suffered from the tumour for ten years, and that four months previous to admission it had begun to increase rapidly in size. Menstruation had ceased since June. The clinical diagnosis was pancreatic cyst, and the treatment was opening and drainage. About two quarts of brownish fluid, resembling altered blood, were evacuated, but unfortunately were not kept. The patient survived the operation for 48 hours.

At the autopsy a very large thick-walled cyst (average thickness of the wall, 8 mm.) was found occupying the upper part of the abdomen. It projected behind the great omentum, between the stomach and transverse colon, which was stretched across the front of the tumour. The ascending colon was also pushed forward by the cyst, and the cæcum was found to have been dislocated upwards almost into the right hypochondrium. The aperture made at the operation perforated the layers of the great omentum and lay between the greater curvature of the stomach and the middle of the transverse colon. Longitudinally the cyst extended from the under side of the diaphragm to the level of the umbilicus, and it occupied the whole of the abdomen from side to side. The pancreas lay in a sort of depression in the posterior wall of the cyst, to which it was closely applied, so that even at the autopsy no separation was feasible, and it was at first thought that the cyst was really of pancreatic origin. The subsequent

dissection showed, however, that this was not the case. The pancreas, though flattened against the back of the tumour, was quite intact, and its duct, of normal size, was traced to its natural termination in the duodenum. On the left side the cyst was intimately adherent to the upper pole of the kidney, and somewhat less so to the spleen. On incising the cyst wall, which was at least 10 mm. thick in this region, and very tough, a yellow streak about 2·5 cm. long and 5 mm. broad was noticed. This proved, on microscopic examination, to be the left suprarenal body, which seemed to have been taken up into the body of the cyst and to have come to form part of its wall. The several layers of cortical cells were somewhat flattened but readily recognisable. Of the medulla, very little could be made out, its place being occupied by a mass of fibroid tissue enclosing a few undoubted medullary cells. In the neighbourhood were many small hæmorrhages, and many of the cortical cells contained brownish pigment. Separated by a thin layer of connective tissue from the main mass of suprarenal tissue lay a couple of curious isolated masses of cortical cells—one of them circular in outline and 0·9 mm. in diameter, and the other oval and about 1 mm. in its long diameter. They appeared to have been cut off from the main mass of the gland by newly formed connective tissue. At one point the suprarenal body came within a millimeter of the lumen of the cyst. The right suprarenal was not comprised in the cyst wall. There is, unfortunately, no note of its having been observed at the autopsy. Portions of the cyst wall removed from various points and microscopically examined revealed the following structure:—The inner lining, varying from 0·25 to 3 mm. thick, was made up of bands of hyaline structureless material resembling fibrin, but not yielding a typical Weigert reaction. These bands ran parallel to the inner wall, and interlaced, so as to form a network, with lengthily ovate or oblong meshes. Close to the lumen these meshes were empty, but as one receded from the inner surface they were gradually filled with leucocytes, mostly polynuclear, and more or less broken down. The hyaline matter, of which the bands were composed, had undergone calcareous infiltration in several places. There were scattered through the cyst wall, especially towards the inner part, patches of genuine fibrin, intermixed with leucocytes. Towards the outside of the cyst wall the fibroblastic element became more and more prominent, and

ultimately developed into a somewhat richly nucleated fibroid tissue. This was distinctly laminated, and between the layers were effused red blood-corpuscles. It was amongst these alternating laminæ of fibrous tissue and effused red corpuscles that the adrenal was included. The detachment of groups of its component cells and their encapsulation by fibrous tissue of a low grade of organisation gave this part of the cyst wall a singularly carcinomatous appearance. Towards the outer part of the cyst wall were many large, thin-walled blood-vessels. Amongst them were many small hæmorrhages, some of which were seemingly quite fresh.

The origin of the cyst is in all probability to be ascribed to some traumatism producing rupture of a vessel near the cœliac axis, and the consequent formation of a hæmatoma within, or behind, the lesser peritoneal cavity. The contents of the hæmatoma must have softened, whilst the outer part underwent organisation, with formation of large, thin-walled vessels, which gave rise to hæmorrhage, and the process thus kept on until the huge sack found at the operation was formed. This, at least, seems to me to be a possible explanation of its mode of formation. I have purposely confined myself in this communication to a description of the conditions found, and have refrained from a discussion of the literature.

DISEASE OF TWO UPPER CERVICAL VERTEBRÆ AND UPPER PART OF LEFT HUMERUS.

By JOSEPH P. DOYLE, L.R.C.P.;
Surgeon to St. Joseph's Hospital for Sick Children.

[Read in the Section of Pathology, January 10, 1902.]

The patient, a boy, aged nine, was admitted to St. Joseph's Hospital, under Dr. Doyle's care, on September 6th, 1901. He was suffering from a pain in the left shoulder joint. The boy stated that he fell from a ladder on a large stone, a distance of six feet. He was found to have a temperature of 100°, and he complained of pain in the joint, and was noticed to carry his head to the left side. On the 28th of the same month the pain was acute, and his neck and arm were stiff. On October 8th Mr. Doyle excised the head of the humerus. The wound healed by first intention. On October 23rd the temperature of the boy rose to 104°, but some days before death it fell to 97°. He looked on the case as one of osteomyelitis. On the night of Dec. 4, in the presence of a nurse his head fell forward and he died suddenly. At the autopsy, Dr. Doyle found the articular surfaces of the first and second cervical vertebræ with their intermediate anterior portions very much eroded. The odontoid process of the axis was considerably diseased, especially the left side, and it protruded through the atlas in a very oblique direction. By the giving way of the transverse ligament the odontoid process pressed on the upper portion of the spinal cord, and thus caused sudden death. The atlas is displaced slightly downwards to the left side, owing to the articular surfaces on that side being much eaten away. And in this position there can be seen the remains of the sinus in the soft tissues, which burrowed down to the acromial end of the clavicle. The pancreas was found enlarged and hard; all the viscera were anæmic but otherwise normal.

Dr. McWeeney thought that the case more resembled one of tuberculosis than of osteomyelitis, of which it would be a very rare example.

Dr. Montgomery moved, and Dr. Watson seconded, that Mr. Doyle's paper be sent to the Reference Committee, which was adopted.

REPORT BY DR. H. C. EARL.

"I have examined the specimens shown by Dr. J. P. Doyle at the Section of Pathology, and submitted to me by the Committee of Reference.

"They consist of the head of the humerus and the upper part of the spinal column.

"The articulations of the atlas with the neighbouring bones are diseased, and only a small fragment of the transverse ligament remains.

"I have examined sections of the head of the humerus and of the diseased portions of the atlas, as well as of some of the ligaments of the affected joints, with the following results:—The cartilage of the head of the humerus is in great part absent, and was replaced by a granulation tissue, which has only slightly invaded the bone. At one point a fibrinous exudation covers this granulation tissue.

"In sections through the lateral mass of the atlas, the remnant of the transverse ligament is partly necrotic and partly changed into a granulation tissue which has invaded, and caused considerable absorption of the bone.

"In none of the tissues examined have I found either tubercles or caseation.

"Sections were stained for tubercle bacilli with a negative result. Micro-organisms were, however, found in the remains of the transverse ligament and in the granulation tissue invading the bones. They were (1) cocci, which stained by Gram's method; and (2) short, thick rods, also staining by Gram. The latter were very few. The former were fairly numerous, about the size of pyogenic cocci, and were generally in pairs, but sometimes in short chains of 4 to 6 cocci. It is not possible to decide if these were pyogenic organisms, nor even if they were connected with the pathological process found. In none of the tissues examined was any pus found."

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] between [illegible] the hound and [illegible] animals [illegible] the pebbles [illegible] our heroes [illegible] of [illegible] words [illegible] [illegible] were her [illegible] [illegible] the hold [illegible] Kerry [illegible] over [illegible] said the hunter [illegible] the hold; she fell [illegible] head. Her arm [illegible] [illegible] the [illegible] the injury [illegible] after the time [illegible] injury [illegible] and after the [illegible] [illegible] of the [illegible] It was [illegible] [illegible] lower end [illegible] [illegible] end of the [illegible] [illegible] [illegible] of the wrist [illegible]

[illegible] was [illegible] are be [illegible] and the [illegible] setting the [illegible] [illegible] red [illegible] treatment. I [illegible] taken to verify [illegible] which I [illegible] From a [illegible] hera-

Colles' Fracture reversed.—Dr. E. H. Bennett.

tion of these details, and of the time which had consolidated the fracture, I concluded that any traction that I could make on the displaced fragment would fail to produce a re-fracture, and that the damage to the structures would only increase the loss of movements of the joint. I did not think it wise to suggest any cutting operation, considering the patient's age, and the amount of damage to the wrist that must attend such a proceeding. I advised passive and active motions of the joint with massage.

Already Roberts and Platt have published good skiagraphs of this fracture, taken at long intervals after the injuries. This is the first instance of it that I have met since the X-rays have come to our help in the diagnosis of its details, and I think it is the first that has been published, taken so soon after the occurrence of the injury.

IMPACTED INTRACAPSULAR FRACTURE OF CERVIX FEMORIS.

By EDWARD H. BENNETT, M.D., Univ. Dubl.; F.R.C.S.I.;

Professor of Surgery in the University of Dublin.

[Read in the Section of Pathology, February 21, 1902.]

The case I desire to submit to the Academy is one of exceptional interest.

In the first place, examples of impacted intracapsular fractures of the neck of the thigh-bone are very rare, and attract special attention, because among them only are to be observed osseous unions of intracapsular fractures. The facts of the case are these:—

On November 19, 1901, a man, aged fifty-one, was carried into Sir Patrick Dun's Hospital, having sustained a severe fall which rendered him powerless either to stand or attempt to walk. He was very stout, and stated that his weight was about seventeen stone. He had been standing on a pile of timber some six feet in height making it fast with a rope; as he pulled on the rope it broke, and he fell to the ground, striking with his right hip and shoulder on to the curb of the pathway. He heard as he struck on his hip a loud crack issue from his bone as it broke. I have many times heard the record of a loud crack heard at the moment of fracture of bone as a detail of the injury, but never before have I heard of its being recorded of fracture of the neck of the thigh-bone. On examination of the injured limb, there was found considerable bruising over and around the great trochanter, and over the deltoid muscle of the right shoulder. The thigh was slightly everted, and the attempt to invert it caused great pain. No shortening of the limb could be detected, but exact measurement was difficult because of the great stoutness of the patient. There was no crepitus obtainable either by movements of the hip-joint or by grasping the trochanteric region. The length of the limb did not alter with traction, but the attempt was very painful.

Impacted intra-capsular Fracture of the Neck of the Thigh Bone.
Dr. E. H. Bennett.

The patient could not raise the heel of the affected limb off the bed, nor can he at this date, nearly three months after the injury; he could with his hands slightly flex the knee without lifting the heel from the bed.

From these facts I concluded that there existed a fracture of the upper end of the thigh-bone, which by the method of exclusion I determined must be either an impacted intracapsular fracture or Cooper's fracture through the trochanter major.

By chance it happened that the X-rays battery was not available, being away to be re-charged. I had then to wait for its return to test my diagnosis. During this wait it was noticed that on the third day moderate effusion had developed in the knee-joint. Assigning Gosselin's value to this sign, I inclined to the diagnosis of fracture through the trochanter major rather than that of impacted intracapsular fracture. In this it will be seen I was wrong. It leads me to lay less stress on the diagnostic value of the sign given by the knee effusion.

On the return of the battery Dr. Watson kindly set to work to photograph the joint. All know how hard it is to get a readable skiagraph of the hip. As yet I have seen only one picture of the ordinary intracapsular fracture which showed the characters of the injury. I believe the picture I now show is the first ever made by X-rays from the impacted intracapsular fracture, nor was it obtained without many trials and failures. I had hoped to show a second picture taken just now three months after the admission of the patient to hospital. His great bulk and fatness made it a very troublesome job, and we have learned only that the fragments remain *in situ*.

The condition now is, I have but little doubt, that of osseous union of the fracture. In both pictures we can see that the form of the fracture is the same as in the cases recorded by Professor R. W. Smith—the same as in the

seven specimens that our Museum holds—the lower fragment impacted into the upper.

I note that in measuring the limb on December 11th a shortening of about one-quarter of an inch was appreciable.

The rarity of the form of fracture, the rarity of the knowledge of its presence furnished by the audible crack I have recorded, the rarity of its exact diagnosis in the living subject, the rarity of its skiagraph—all, I think, justify my detaining the Academy with this brief note.

DR. KNOTT observed that the Irish School of Surgery had now registered another of the many landmarks of the advance of osseous pathology, which had been laid during a long series of years by Mr. Robert Adams, Professor R. W. Smith, and his successor Professor E. H. Bennett. The fracture, which derived its name from the great Dublin surgeon, had received its best and most apt illustrations from the author of the present communication. With regard to the fracture of the neck of the femur, Dr. Knott congratulated Professor Bennett on having secured a skiagram of impacted fracture of the neck. He would like to ask what was Dr. Bennett's explanation of the universal rule of non-union in cases of non-impacted intracapsular fracture of the femur. The direction of impaction in this case agreed with Professor R. W. Smith's rule that the neck always penetrated the other fragment.

PROFESSOR BENNETT, in reply to Dr. Knott's query, said he thought all surgeons were now agreed that the non-union of non-impacted intracapsular fractures was due to want of contact of the fragments and want of rest of the part. In all the specimens he had seen the lower fragment was impacted in the upper.

CASE OF TUBERCULOUS PLEURO-PERICARDITIS. CULTIVATION OF THE BACILLI ON LOEFFLER'S SERUM DIRECT FROM THE LESIONS.

By E. J. McWEENEY, M.A., M.D. (R.U.I.); D.P.H; M.R.C.P.I.;
Professor of Pathology and Bacteriology in the Medical School of the Catholic University, Dublin;
Bacteriologist to the Local Government Board for Ireland.

[Read in the Section of Pathology, February 21, 1902.]

THE patient, T. E., male, aged fifty-five, was admitted into the Mater Misericordiæ Hospital with left pleural effusion. Clear serum to the amount of 74 ounces was evacuated by tapping. Dulness was afterwards noted in the left hypochondrium, but there were no gastric symptoms, and the dulness was looked upon as due to an enlarged spleen—a view which was confirmed on the autopsy.

The *post-mortem* findings were:—An emaciated male body; pericardium much thickened; its anterior [mediastinal] surface thickly coated with inflammatory lymph, beneath which were little islets of caseation, some of which went right through to the serous aspect, where they appeared beneath the serous membrane as little yellowish plaques, smaller than a split pea. Beneath the upper part of the pericardium, where it overlay the great vessels, were several small caseous glands. *Heart.*—On its anterior surface, corresponding to the tubercular plaques on the parietal pericardium, were a few very small, greyish granular masses seated on the epicardium and (microscopically) seen to be tubercles. They were evidently the result of inoculation by friction. The endocardium, valves, and myocardium seemed normal. *Left Lung.*—Upper lobe œdematous, lower lobe collapsed and airless, the pleura covered with a very thick layer of reticular fibrin, enclosing small caseous points as big as a pin's head. *Right Lung* contained many patches of consolidation up to the size of hazel nuts, and, on section, presenting small whitish dots on a grey surface [tubercular broncho-pneumonia]. Elsewhere the

parenchyma was air-containing, and the *pleura was quite free. Spleen.*—Much enlarged, weighed 22 ozs.; surface covered with a distinct, though thin, exudate; consistency increased, sprinkled with cheesy areas as big as a split pea. Under the microscope these contained enormous numbers of tubercle bacilli, but not a giant cell or other trace of tubercular structure. *Kidneys* weighed together 12 ozs., consistency firm, capsule stripped with difficulty, leaving many small depressions corresponding to minute cysts in the cortex, which also presented small white areas, smaller than a pin's head, and microscopically consisting of caseous foci enclosing masses of tubercle bacilli so large as to be just visible to the naked eye in the stained and mounted preparation. *Liver.*—Weight 54 ozs.; scrutiny of the cut surface with a hand-lense showed minute opaque clots, which proved microscopically to be similar to those in the kidney, and, like them, to contain tubercle bacilli in large numbers. *Digestive Canal* normal. *Aorta* extremely atheromatous; at the convexity of the arch was a group of caseous superior pericardial lymphatics which seemed on the point of ulcerating through into the blood-stream.

Brain and *Cord* could not be examined.

This case is one of terminal generalised infection with large numbers of tubercle bacilli. The areas of necrosis are not tubercles, for they show no trace of tubercular structure, containing neither epithelioid nor giant cells. The reactive forces of the individual may have been too depressed, or the virulence of the bacilli or their number too great for the development of the usual tissue-changes. The case is a most striking example of the inverse ratio so often remarked between the "typicity" of tubercular structure and the number of bacilli. The source of the bacilli is in all probability to be looked for in a discharge of the caseous contents of some mediastinal gland into the blood-stream. The appearances at the aortic convexity are highly suggestive of a repetition of this process, prevented by the death of the patient. The caseous areas lay within a millimeter or two of the atheromatous intima, and this part of the vessel closely

resembles the beautiful preparations shown by Prof. Benda at the London Tuberculosis Congress as illustrating intravascular tuberculosis. The condition of the pericardium was extremely interesting, and very similar to that in a case which he (the speaker) had shown at that Section last year. The caseous areas contained masses of bacilli quite visible to the unaided eye when the preparation was held up to the light. Since reading Osler's paper on the causation of pericarditis he had found that a much larger number of cases were of tubercular origin than was generally thought in this country to be the case. Careful examination was required to establish their true nature, and the tubercular nature of many cases had undoubtedly escaped observation.

The large number of bacilli present in this case made it a suitable one for cultivative experiments, and he had accordingly "skipped" the guinea-pig stage and started cultures on Loeffler's serum direct from the pericardium. About half the tubes inoculated yielded pure cultures of the tubercle bacillus, and exhibited extremely well the lichenoid growth and the tendency to spread on to the glass. From the serum he had transplanted on to glycerinated potato, and now showed some very luxuriant growths, the bacillary serum being of a light reddish hue. It had spread on to the dilute glycerine below the constriction. Cultures of the third generation on glycerine-agar were succeeding well. In these the bacillary growth was whitish. From the standpoint of pathological anatomy and bacteriology he thought the case was worthy of being laid before the Section.

NOTES ON A HUGE ABDOMINAL CYST.

By W. J. THOMPSON, M.D., M.R.C.P.;
Physician to Jervis-street Hospital.

[Read in the Section of Pathology, February 21, 1902.]

E. B., mechanical engineer, for some time working at Woolwich Arsenal, aged thirty-six years, unmarried, was admitted to Jervis-street Hospital on October 9th, 1901, with the following history:—In April, 1899, while at particularly heavy work, he felt that he strained himself about the region of the stomach, and from that time he always felt uncomfortable about the upper part of the abdomen. In the following July he got an acute attack of English cholera, and was obliged to remain from work for some days. From that period he was frequently subject to attacks of pain in the upper part of the abdomen, accompanied with vomiting, but no diarrhœa. These became so frequent and severe that he had in the spring of 1900 to give up work. About this time he attended as an out-patient one of the London hospitals for what he himself described as dyspepsia. In May, 1900, he first noticed a swelling in the region of the liver, and this gradually increased until it attained its present size. From the commencement of the swelling he had no pains—only a tight feeling—but the vomiting continued. He had a good family history; had himself always been strong and healthy, was 5 ft. 8 in. high, and before his illness weighed about 12 stone. He was temperate and regular in his habits, and denied ever having syphilis or gonorrhœa. On admission he was found to be thin and emaciated, weighing 10 stone. The upper part of the abdomen was greatly distended in the right hypochondria, the epigastria and part of the left hypochondria, the right lumbar and umbilical regions—the point of most prominence being at the junction of the 8th costal cartilage on the right side; the costal cartilage was everted at this point. There was well-marked bulging in the right flank and back, even when the patient was placed in the prone position. The swelling was absolutely dull on percussion, and fluctuation was with difficulty obtained. The free borders could easily be

defined in the left hypochondria, left lumbar and inguinal regions. The following measurements were recorded:—Circumference at level of junction of 8th costal cartilage, 39 inches; at umbilicus, 38 inches; distance of tip of ensiform cartilage from umbilicus, 8 inches; distance of umbilicus from pubes, 6½ inches. The urine was found to be normal in quality and quantity. No change could be detected under the microscope in the blood; he was not jaundiced; had not fatty stools; temperature was normal; heart and lungs sound; respirations quickened and shallow due to the pressure. The vomited matter was ordinary gastric, sometimes mixed with that of biliary origin; but at no time did he vomit more than what he consumed. For the first two weeks after admission he seemed to improve and put on 5 lbs. in weight; was able to take and retain more nourishment and be up and about. After that time he gradually got worse, the vomiting became more persistent, so much so that he had to be fed by nutrient enemata. He lost flesh rapidly, and shortly before his death, which took place on December 13th, he only weighed 8 stone 4 lbs. During the latter part of his illness the cyst became movable, and could easily be displaced from one side to the other. He was frequently urged to allow an operation, but would never consent.

It seems from cases recorded that operations are frequently successful. Osler, in his recent work on abdominal tumours, describes a case with history and symptoms almost similar to this one. His case was operated on and made a good recovery. The contents of the cysts evacuated was found to be dark, coffee-coloured fluid, containing granular *débris* and much altered blood with some fresh red blood corpuscles.

The diagnosis arrived at was that it was a huge cyst, and that it was either in connection with the pancreas or omentum, or that it was situated in the lesser sac of the peritoneum—the first, that of the pancreas, being the most likely.

The origin of such cysts is rather obscure; as usual, different authors put forward different theories. It is now generally held that they are of traumatic origin, and that they first commence as blood cysts. As far back as 1892

Mr. Jordan Lloyd, in a paper published in the *British Medical Journal,* then suggested that such cases were the result of contusions or traumatism in the upper part of the abdomen, and this might be either attached to the pancreas or to the omentum, or to the lesser sac of the peritoneum. With this view Osler and other prominent writers agree.

At the *post-mortem* examination, on opening the abdomen, there were a great number of adhesions but no ascitic fluid. The cyst was very movable, and, as you see, had the stomach stretched out and adherent to the anterior surface. The pancreas and descending aorta are embedded in its walls. Its circumference measured 32 ins. All the other abdominal organs seemed healthy, and there were no enlarged glands.

Dr. E. J. McWeeney said that this extremely interesting cyst was preserved unopened on his (Dr. McWeeney's) advice. It is a good illustration of the rapid growth to an enormous size to which pancreatic tumours, or tumours connected with the pancreas, may attain. Some time ago he exhibited to the Section a tumour which, before removal, he considered to be of pancreatic origin, but on dissecting it out he found that, although the pancreas was attached to, and might be said to form a part of, its posterior wall, it was a hæmatoma of the lesser peritoneal cavity, with walls, such as one found in large aneurysms, of organised blood-clot.

NOTE ON A CASE OF TUBERCULOSIS OF THE GENITO-URINARY TRACT.

By T. P. C. KIRKPATRICK, M.D.;
Assistant Physician to Steevens' Hospital.

[Read in the Section of Pathology, March 21, 1902.[

The patient, A. M., male, aged forty-four years, was admitted to Steevens' Hospital complaining of pain in the back and frequency of micturition. He stated that he had been in this condition for some six months past, but that the pain was gradually getting worse, and gave him considerable trouble when he moved about.

On examination the pain was found to be localised to a small area in the left loin. The urine contained a small but constant quantity of albumin, but no pus or cellular elements; it was clear and acid in reaction. The left epididymis and vas as far as the external ring were hard and considerably enlarged, but not painful. Examination per rectum showed a small, nodular enlargement in the left seminal vesicle. The lungs and other organs appeared healthy. Repeated examination of the urine for tubercle bacilli gave a negative result. Deep pressure over the left kidney caused the patient to desire to micturate, but nothing more than an indefinite sense of resistance and fulness could be made out, even when the patient was fully under the influence of an anæsthetic. Examination by X-rays for renal stone gave a negative result. As the disease of the genital organs caused the patient no trouble and all the symptoms pointed to the kidney, it was decided to expose that organ and remove it if necessary. Mr. Haughton opened the abdomen and explored both kidneys. The left was found enlarged and apparently cystic, while the right appeared normal. The patient, however, became so collapsed on the table that it was decided to postpone the removal of the organ to a subsequent date. The patient died three days after the operation.

At the *post-mortem* examination the right kidney was found to be slightly enlarged but apparently healthy, as was also the right ureter. The left kidney was converted into a large, semi-

solid caseous mass with little or no renal structure left, though the capsule was intact. The left ureter was filled with a similar material right down to its entrance into the bladder, and its lumen was completely obliterated. The bladder itself appeared quite healthy. The left epididymis and vas, as far as the external abdominal ring, were in a similar state of caseous degeneration, but that part of the vas which was inside the abdominal cavity was healthy except for a few scattered nodules of caseous material. There were similar nodules in the right vas and the seminal vesicles. None of the other organs in the body showed any signs of tuberculous disease.

It is interesting to speculate, but I fear impossible to decide, what was the primary focus of disease. The patient could give no information as to the onset of the testicular enlargement; he stated that he did not even know of its existence till his attention was accidentally drawn to it while he was in the hospital. Absence of any cellular elements in the urine was doubtless due to the fact that the ureter was completely obstructed and the renal tissue completely destroyed. Why, however, the renal symptoms, such as pain in the back and pain on passing water, and the frequency of micturition, with the albuminuria, should have persisted is not very clear. The difficulties of an accurate diagnosis *ante-mortem* were very great, and the information gained at the *post-mortem* does not completely remove them; it was in the hopes that some of the members present would be able more accurately to connect the clinical symptoms with the pathological conditions that induced me to bring the case forward.

I should have stated that the patient had no fever at any time during his stay in hospital before the operation.

COLLES'S FRACTURE.

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[Read in the Section of Pathology, March 21, 1902.]

A good specimen of osseous union of fracture of the lower part of the radius having recently come into my possession, I thought that I would do myself the honour of laying it before the members of the Pathological Section, for whom the fracture which has been indelibly stamped with the name of the great Dublin surgeon must ever possess a perennial interest.

Although the name of Colles is in these countries invariably associated with the usual form of solution of continuity so frequently met with in the lower part of the radius, the frequency of the occurrence of fracture in this locality had long before been pointed out by Pouteau, whose description of the signs of this lesion (*Œuvres Posthumes*, Vol. II.) will be found a vividly graphic picture of its most prominent features. His pithy remark that this is, of all fractures, the one in which an accurate diagnosis can be most certainly made by a single *coup d'œil* has become a surgical aphorism; his theory of the mechanics of the fracture—that it was due to a spasmodic contraction of the pronator and supinator muscles of the forearm—will not find so many admirers at the present day. He very ingeniously compares the bones of the forearm to the segment of a circle, of which the arc is represented by the radius, and the chord is formed by the ulna, and so demonstrates—to his own apparent satisfaction, at least—that the action of the pronator muscles on the curved bone, in approximating the

fragments to the ulna, must be to produce lengthening of the broken radius. To this fancied lengthening it is that he attributes the peculiar displacement of the carpus, which he places *first* in his enumeration of the characteristic signs of the lesion. The other typical signs which he mentions in order are: *second*, the tumour on the palmar aspect of the forearm, caused, as he thought, by the contraction of the pronator quadratus, throwing forwards the flexor tendons; *third*, diminished breadth of the forearm at the seat of fracture, produced by the action of the same muscle; which caused approximation of the fragments, and consequent obliteration of the interosseous space; and, *fourthly*, increased size of the wrist, produced by the *mouvement de la bascule*, communicated to the styloid process of the broken radius. He also remarks that it is not necessary to expect much displacement at the seat of fracture, but a depression of the arch—which is aptly compared to the *lezarde* or *baillement* of architectural ornamentation.

Yet, strange to say, notwithstanding Pouteau's recognition of the importance and frequency of fractures of the lower segment of the radius, we find his teaching on this subject absolutely ignored by subsequent authorities in French surgery for a very considerable period. Boyer does not seem to have been aware of the occurrence of such a lesion; and although he does speak of fractures of the radius produced by falls on the hand, he places the seat of the solution of continuity in such cases at the middle of the shaft of the bone. In Désault's *Journal de Chirurgie* there appeared, indeed, in 1790, a record of a single case of fracture of the lower end of the radius, observed by Horne. But the case is merely noted without further comment, and the writer does not make the slightest allusion to Pouteau's description. Most of the leading surgical authorities of the time followed the old errors; the four luxations of the

wrist were unanimously recognised, their characteristic signs pointed out, and appropriate treatment recommended. And it was not till 1820 that Dupuytren—by the immense influence of his writings and clinical lectures—succeeded in convincing his surgical fellow-countrymen of the non-existence of those luxations of the wrist, of which he declared that he had never seen a genuine example throughout the whole range of his enormous experience; and of the great frequency of fractures of the carpal extremity of the radius, which formed a fifth of the total number occurring in his practice. So completely was the work of foreigners in this direction ignored by French authorities that we find Voillemier, in 1842, giving Dupuytren the credit of having *created*, so to speak, this fracture of the lower end of the radius. In the year 1814 the short, but very graphic, description of Abraham Colles appeared in the pages of the *Edinburgh Medical and Surgical Journal;* and, with the exception of the localisation of the plane of the fracture, which he placed an inch and a half above the carpal extremity of the bone, his account of the lesion has suffered but little at the hands of subsequent critics. Colles does not appear to have been aware that any previous accounts had been published, and wished to call the attention of surgeons to the frequency of the occurrence of a solution of continuity of the lower end of the radius, and the extreme infrequency of the forward (or so-called Désault's) dislocation of the carpal extremity of this bone, for which it had been habitually mistaken. The rapid swelling of the surrounding parts which follows the occurrence of this lesion, and the absence of crepitus—so often hard to elicit in fractures near joints—combined to render the difficulty of ascertaining the true nature of such injuries very considerable indeed. He points out the depression which can be seen about an inch and a half above the

lower end of the radius; the swelling, and the backward displacement of the wrist and metacarpus; the fulness on the anterior aspect of the forearm, limited below by the anterior annular ligament of the wrist, and apparently caused by the flexor tendons being pressed forwards; and the projection of the lower end of the ulna towards the palm and inner side, to a degree varying in different instances. The lower end of this bone can be moved backwards and forwards with abnormal facility; but an examination of the radius at the seat of fracture fails to detect either crepitus or yielding of the fragments till extension has been made in such a way as to restore the limb to its natural form. A backward and forward movement will then be found to cause a sensible yielding of the broken surfaces. The inward projection of the lower end of the ulna was attributed by him to the pressure of the upper end of the carpal fragment of the radius—the yielding of the other bone being facilitated by laceration of the ligaments of the inferior radio-ulnar-articulation. Such is Colles's account of the fracture which bears his name. Imperfect it, of course, is; but for an original description, we cannot but admire the sagacity with which he appreciated, and the happy simplicity and clearness of language with which he has detailed, the diagnostic value of the various local signs of this lesion.

The teaching of Pouteau remained, as we have seen, ignored or neglected till the subject was revived by Dupuytren. Somewhat similarly, that of Colles was but little discussed in these countries till a new interest was given to the subject by the enthusiastic genius of Professor R. W. Smith, of the University of Dublin. Indeed it is to the world-wide influence of the opinions and writings of Dupuytren and Smith that may chiefly be attributed the prominence which has since their time been

accorded in the literature of our profession to the discussion of this, the most frequently-occurring, according to some authorities, of all the fractures that are met with in the human skeleton.

While Colles had contented himself with pointing out the comparative frequency of the occurrence of fracture in this position, and the rare occurrence of dislocation, Dupuytren went o far as to doubt—although not, of course, absolutely deny—the possibility of the occurrence of a luxation at the radio-carpal articulation. In this connection, amusing stories are still recorded of the fierce clinical disputes which sometimes took place on the subject, even in presence of the patients, between the hot-tempered surgeon of the Hôtel Dieu and his colleagues, Pelletan and Marjolin; both of whom remained for a long time orthodox believers in the errors which had been impressed on them by their earliest surgical teachers. In one case a man who had fallen on the "heel" of his extended hand was brought into the hospital presenting the characteristic deformity of the lower end of the forearm. The case was critically examined by both Marjolin and Dupuytren. The former arrived at a diagnosis of luxation of the carpus; the latter of fracture of the radius. Neither was disposed to yield one jot or one tittle to the opinion of the other; when an opportunity was afforded of settling the point, by the death of the patient from some intercurrent disease. The autopsy was made in the presence of the two surgical gladiators. The victory remained with Dupuytren.

In the description of this lesion, which the great French surgeon published in the *Lancette Française* in the year 1820, he notices the change in the axis of the forearm, and also in that of the hand—the latter being carried to the radial side by a movement of *abduction de totalité*. The projection of the lower end of the ulna is explained by the

displacement of the hand. He indicates the position of the anterior and posterior tumours; the former of which he refers to the angular projection of the fragments in front, and the latter to the prominence of the carpus behind. He also adds that, in those cases in which an opportunity had been afforded of examining the recent specimen, he had always found the inferior fragment divided by radiating lines into several pieces, as if it had been violently struck with a hammer. To this condition he applied the term *fracture par écrasement.* He places the seat of fracture at two or three lines—up to half an inch—rarely so high as an inch or more, above the lower end of the bone, but makes no reference to any obliquity of the plane of fracture. In his *Leçons Orales*, he dwells with great ingenuity on the remarkable analogy which exists between this fracture and that of the lower end of the fibula, with which the name of Pott is now inseparably associated; and traces the prominent features of resemblance between the two lesions. The abduction of the hand in one case is compared to the eversion of the foot in the other. The projection of the lower end of the ulna has its counterpart in the prominence of the inferior extremity of the tibia; the posterior depression at the seat of the radial fracture is comparable to the *coup de hache* which is observed above the external malleolus in the fibular lesion; while the action of the long abductor of the thumb (extensor ossis metacarpi pollicis) is supposed to have an influence on the carpal deformity, in the lesion of the upper extremity, similar to that which is exercised on the distortion of the foot by the peronei muscles in cases of solution of continuity of the lower segment of the fibula.

The fact that the radius alone gives way is accounted for by Dupuytren by the greater resistance which this bone offers at the time of the application of the force; as this

bone, only, articulates directly with the carpus. From this anatomical fact it appropriately received the appellation, which was conferred upon it by the imaginative anatomists of olden times, of *manubrium manus*. This arrangement necessitates the transmission to the radius of all the force which is communicated to the upper extremity by a fall on the hand. The situation of the fracture at the lower end, in spite of the greater thickness and apparent strength of the bone in that position, will be understood when it is remembered that the whole violence of the fall is at first concentrated on that segment of the radius; and that the increased thickness does not by any means denote greater solidity, as the osseous tissue at the elect seat of fracture is almost purely cancellous. The liability to fracture is also, according to this very observant surgeon, immensely increased by the almost complete impossibility of dislocation. This latter feature is accounted for by the enormous resistance offered by the tendons of both flexors and extensors of the wrist, which are closely applied to the surfaces of the radio-carpal articulation. If, as he believes, the application of a force of 2,000 lbs. would be insufficient to overcome this resistance, a fall on the hand under the ordinary circumstances must fail to do so; as the so-called momentum or moving force, which is calculated by multiplying the weight of a body by its velocity, will not, except in falls from a considerable height, give so large a figure as this. A violent fall on the hand, accordingly, if not followed by a dislocation of both bones backwards at the elbow-joint, nearly always produces a fracture of the lower end of the radius. Sometimes the result may be found to be a severe sprain of the wrist-joint, or fracture of some of the phalanges or metacarpal bones; but such results are not often seen.

This still obscure lesion was made the subject of two

very interesting and valuable communications by Goyrand (d'Aix), of which the first appeared in the *Gazette Médicale* in 1832, and the second four years later in the *Journal Hebdomadaire.* This observer lays great stress on an important feature which would appear to have been overlooked by Dupuytren—the obliquity of the plane of fracture. This, according to him, takes, in nineteen cases out of twenty, a direction from above and behind downwards and forwards. He also makes three varieties of the injury:—(1) In which the plane of fracture runs from behind downwards and forwards—by far the most frequent; (2) in which the plane of obliquity passes from the anterior aspect of the bone downwards and backwards—comparatively rare; and (3) the fracture "*en étoile*" of Dupuytren. In cases of the first type the lower fragment glides upon the inclined plane formed by the oblique surface of the other, and so becomes displaced upwards and backwards; either by muscular action alone, or by the continuation of the violence which had produced the fracture after the solution of continuity had been effected. In the latter case, the displacement would necessarily be much more considerable. At the same time, as the lower fragment is still tied to the ulna by the triangular fibro-cartilage, it is compelled to undergo a rotatory movement, in which it describes an arc of a circle; of which the radius is formed by the said fibro-cartilage, and the centre is at its point of attachment to the base of the styloid process of the ulna. In the course of this double movement, the articular surface of the carpal fragment of the radius undergoes a change of direction; so that, instead of looking forwards and inwards, it becomes inclined backwards and outwards. In the second of Goyrand's types, analogous displacements take place—but in the opposite direction; and with the further modification that the forward translation of the lower fragment is less

pronounced than the backward in the other case. The rotation of the lower fragment leaves the articular surface with a more forward direction than exists in the normal condition. With regard to abduction of the hand, he expresses an opinion very strongly opposed to that of Dupuytren, who regarded this sign as one of the most characteristic of a fracture located near the lower end of the radius. Goyrand, on the other hand, regards its occurrence as quite exceptional; and insists that so long as the internal lateral ligament of the wrist and the styloid process of the ulna remain whole, the hand will be found inclined—not outwards, but inwards. He admits that in the rarer cases in which the internal lateral ligament had been torn by exceptional violence, or the styloid process wrenched from the head of the ulna, the axis of the injured hand will be found to have undergone some degree of deviation to the radial side of the forearm.

The mechanism of the fracture is referred by this authority to *contre-coup*. In a fall on the palm of the hand, the whole weight of the body is thrown upon the latter. The carpus, being broken up into a great number of separate pieces by movable articulations, decomposes the shock, and thus successfully resists it. Then the radius placed between the weight of the falling body and the carpus, supported by the ground, receives the whole transmitted force at its inferior extremity; where, from the extreme sponginess of its structure, it is least able to resist. The opinion of Goyrand on the relative frequency of this fracture is somewhat remarkable. He roundly asserts that the number of cases admitted to the Hôpital d'Aix bore to the collective sum of all other fractures the proportion of one to two. In other words, Colles's fracture, in his experience, formed one-third of the sum total of the fractures occurring in the human body. At the same time he notes that

many genuine cases escaped his observation; because the patients often looked upon the injury as a sprain, and did not apply for assistance at the hospital.

Goyrand had arrived at, or confirmed, many of his own special views on the fracture by experiments on the cadaver. M. Bouchut, in a thesis on the same subject—published in 1834—gave the result of a larger series of experiments in the same line of research. The example would appear to have become infectious, for a host of other investigators followed the same path; each of whom threw, or believed that he threw, some additional rays of light on the debated or previously misunderstood problems which still obscured the mechanism and pathology of the fractures of the carpal extremity of the radius.

In a communication made by Diday a few years later to the pages of the *Archives Génerales de Médecine*, the mechanism of the causation of this fracture was discussed with laborious care and precision. He tried to define and sketch the application of the force and its results with mathematical accuracy; and explained the obliquity of the plane of fracture by the decomposition into two forces of the momentum of the body in falling on the radius, when inclined to the surface of the ground at an acute angle. According to the well-known law of parallel forces, one of these is in a direction parallel to the surface of the ground, and, necessarily, becomes completely neutralised; the other is perpendicular to the same plane; and, accordingly, is the only one which is able to act. As the line of the direction of the vertical force intersects the shaft of the radius in the oblique position into which this bone is thrown at the moment of the fall, "it is clear that the solution of continuity ought, as in all fractures by *contre-coup*, to follow the same direction as that of the force which produces it; and will, in this case, follow an oblique line running down-

wards and forwards—in relation to the radius, considered in the position which it occupies in the subject when in the vertical posture." A corresponding explanation applies to the reverse obliquity of the plane of fracture in the rarer cases where it is produced by a fall on the back of the hand. He also lays much stress upon the phenomenon of the *shortening* of the broken radius, which he attributes to the over-riding of the fragments; and which, in his experience, was invariably present—amounting, in some cases, to five or six lines. He also describes the backward displacement of the carpus, and the forward projection of the carpal extremity of the ulna. The shortening of the radius has the effect of throwing the surfaces of the inferior radio-ulnar articulation out of their normal mutual contact; hence the impediment to the movements of pronation and supination which so often continues for a considerable time after the union of the fracture has been completed.

Velpeau, writing on this fertile subject in 1842, for the pages of the *Dictionnaire de Médecine*, occupied himself chiefly with the diagnosis. He pointed out two conspicuous—and hitherto undescribed—physical signs, which he professed to believe must secure the surgeon of the future from possible error. The first of these is the constant presence of the deformity "*en Z*," which he asserted to be pathognomonic of the peculiar fracture which engages the carpal segment of the radius. The second is the elevation of the external group of radial tendons; which, instead of lying, as in the normal state, close to the surface of the bone, will be found to stand out prominently beneath the skin, separated from the back of the lower part of the radius by an interval of six or eight millimetres. The Z-shaped distortion is evident to the eye, whether the affected limb be viewed in profile or antero-posteriorly. In the former aspect, one extreme limb of the

Z is formed by the axis of the radius, the other by the vertical axis of the carpus; while the intermediate line of junction is formed by a line drawn from the inferior extremity of the prominence formed at the seat of fracture in front, to the superior extremity of the carpal prominence behind. The general aspect of the back of the limb at the seat of fracture he likens to that of a dinner-fork.

This same year of 1842 marks an epoch in the literature of fractures of the lower end of the radius, for it also saw the publication of the important memoir of Voillemier, the most elaborate and exhaustive which had yet appeared on the subject. According to this ingenious writer, the form of fracture which is most frequently met with in this situation is that which he describes under the name of *fracture par pénétration.* For a correct appreciation of his hypothesis, we must make ourselves pretty accurately acquainted with the structure of the lower end of the radius. The layer of compact tissue, which forms nearly the whole thickness of the shaft of this bone through the greater part of its length, rapidly diminishes in thickness as it approaches the carpal extremity; and is, for the last centimetre or so, nearly as thin as ordinary parchment. In front, a layer of tolerable thickness is prolonged a little further down than on the posterior surface. Accordingly, in a fall on the hand, when the force is transmitted directly from the carpal bones to the lower end of the radius, a solution of continuity takes place at the level where the investing wall of compact tissue has nearly ceased to exist; and the continuation of the force causes the solid tube of compact tissue to penetrate the comparatively fragile substance of the spongy mass beneath. If the force has been moderate, the degree of impaction is slight, merely causing a firm interlocking of the fragments; whereas if the violence happens to be extreme, the superior fragment con-

tinues to descend, and, crushing the carpal end between it and the bones of the wrist, breaks it up into a number of small pieces. In this way is established the condition described by Dupuytren under the name of *fracture par écrasement.*

The oblique position of the limb at the time of falling causes, according to this writer, the force to tell more effectively on the posterior part of the articular end of the bone. This effect is also further emphasised by the fact that this part rests more directly on the carpal bones when the wrist is extended; and, on account of the forward curvature of the lower end of the radius, is placed more in the line of the long axis of the bone. Accordingly, the impaction of the upper into the lower fragment commences posteriorly; while the latter is, at the same time, carried somewhat backwards. On this account, the posterior wall of the upper fragment penetrates the spongy tissue of the lower; while the anterior wall, on the other hand, is found to overlap that of the lower fragment in front, so that the resulting condition established on this aspect is a mutual interpenetration—almost confined to cancellous tissue. A similar graduation will be found to exist when we examine the seat of fracture from without inwards. The outer compact wall of the upper fragment will be found to have penetrated the carpal piece in the direction of a vertical plane, which, if prolonged, would separate the styloid process from the shaft of the bone; while the inner surface will be found to over-ride that of the lower fragment.

The obliquity of the plane of fracture, then, according to Voillemier, is but apparent; and the deception is due to the backward deviation of the lower fragment, and the greater depth of the posterior penetration. The evidence upon which he relies as being absolutely conclusive of the truth of his theory, and which he never failed to find when

search was made, is a vertical line of compact tissue imbedded in the cancellous structure of the lower fragment. This, when traced upwards, is always found to be continuous with the investing compact structure of the shaft.

In the rarer cases in which the lower fragment undergoes forward displacement, the line of imbedded compact tissue is found to be continuous with the anterior wall of the shaft. And in no case of this fracture does a vertical section display both an anterior and a posterior line of penetrating compact tissue, even when the carpal fragment has undergone but the minimal amount of deviation from its normal axis. From the apparent dilemma offered by the latter class of case, Voillemier extricates himself by pointing out that, although reciprocal penetration always takes place, the compact investing layer of the lower fragment is so extremely fragile that it offers, practically, no resistance; and is, in a great measure, broken up at the time of the injury.

Another mechanical explanation is offered by this writer to account for the occurrence of a much less frequent form of fracture which is met with in this vicinity. Experiments on the cadaver had proved to him that extreme flexion or extension of the hand nearly always had the effect of wrenching off a piece of the lower end of the radius; and in this way, he believed, should be explained the epiphysary disjunction so often found in young subjects. A fracture occurring in this way, in more advanced life, sometimes engaged the articular surface, and removed an oblique slice, either anteriorly or posteriorly; while, in other cases, it detached a fragment of the usual length, inclusive of the whole thickness of the bone. He includes all such cases under the generic name of *fracture par arrachement.* This he would make to include all those cases in which, after a history which would lead to a sus-

picion of fracture, the predominant symptoms indicate rather the existence of a sprain—where fixed deformity and crepitus are absent, and an obscure mobility is the only local sign justifying the opinion that a solution of continuity of the bone has taken place. He gives two remarkable cases in point. In one, a fall on the anterior surface of the lower half of the hand was the cause of the fracture; in the other, a very powerful young man had had his wrist violently flexed by a friend while engaged in some kind of athletic play. In both the symptoms were of the obscure kind above referred to.

With regard to the local signs of the typical form of fracture of the carpal extremity of the radius, Voillemier insists that the abduction of the hand, on which Dupuytren lays so much stress, is more apparent than real. In those cases in which it is most evident, the axis of the hand is merely brought to approach that of the forearm; but in the great majority of cases, according to him, the hand completely preserves its normal position of adduction. He dwells at some length on the features of the antero-posterior distortion of the limb; in which the long axis is broken up into three parts, forming so many inclined planes meeting at obtuse angles. One of these is that of the axis of the upper fragment; a second is formed by that of the lower; while a third is formed by that of the carpus and metacarpus. The radial border of the limb will be found to present a similar deformity; so that, laterally, as well as antero-posteriorly, a single *coup d'œil* will suffice to detect the characteristic deformity "*en Z*," as it was very happily named about this same date by Velpeau. Voillemier entirely rejects the rotatory movement of the carpal fragment around the triangular fibro-cartilage which had been so carefully described by Goyrand, as well as the *mouvement en bascule* of Pouteau; while the very unmistakable

deformity, together with the absence of premature mobility and of crepitus, are accounted for by the mutual impaction of the fragments of the broken bone.

Nélaton published his great work—the *Pathologie Chirurgicale*—in 1844. In this he adopts the impaction theory of Voillemier; with the slight modification that mutual impaction very rarely occurs—the brachial fragment only penetrating the carpal, and only at the posterior part. He also makes the plane of fracture transverse; but, contrary to the expressed opinion of Voillemier, believes that abduction of the hand is frequently present. The triangular fibro-cartilage generally loses its ulnar attachment, either by laceration of its fibres or fracture of the styloid process of the ulna; and, accordingly, shortening of the broken radius is permitted to take place, with a semi-luxation of the inferior radio-ulnar articulation. He describes in terms more clear, perhaps, than those of any preceding writer on the subject, his views on the mechanism of the fracture. The forearm, in a fall on the hand, forming a right angle with the latter, comes to press directly at its carpal end, on an arch formed by the first row of carpal bones. This latter resists in supporting itself (1) on the ground by its internal extremity, which is formed by the pisiform bone, (2) on the trapezium by its external pillar—formed by the scaphoid, and (3) on the central segment—formed by the os magnum and unciform. The radius being thus pressed between the weight of the falling body on one side, and the resistance of the ground, transmitted through the carpal bones, on the other, yields at a short distance from the articulation.

I have already referred to Bouchut's account of his experiments on the dead body with the view of deciding the question of the possibility of producing a dislocation of the wrist-joint. He sacrificed to his zeal for truth both fore-

arms of twenty bodies, but all his efforts to produce a carpal luxation were found useless. The continuity of the radius yielded, in every instance, either to extreme flexion or extreme extension—more easily to the latter. At an earlier date (1832) Malgaigne had firmly denied that there was such a thing on record as a *bonâ fide* example of dislocation of the wrist; and after critical examination, rejected without compromise the only three cases that the literature of surgery then afforded, and which had been reported on the respective authorities of Ravaton, Thomassin, and Cruveilhier. In a valuable essay on the same subject, published two years later by Roquetta, the latter arrives at the same conclusion.

In 1845 Bonnet, of Lyons, published the results of his experiments on the cadaver in this connection. He nearly always succeeded in fracturing the carpal end of the radius by forcible extension of the hand, but all his efforts to obtain such a result by flexion entirely failed. His efforts in the latter direction ruptured tendons and ligaments, and occasionally even fractured some of the carpal bones, but made no impression on either of the bones of the forearm.

In 1846 the views of Voillemier, which at that date had obtained almost supreme sway, were ingeniously contested by Jarjavay. This surgical critic asserted that Voillemier had been misled by the appearances presented by united fractures, from the fact that the periosteum, which is very strong on the posterior aspect of the carpal end of the radius, is seldom torn in these cases; but, becoming detached for some distance upwards and downwards from the seat of fracture, leaves a more or less considerable subperiosteal space, which in the progress of union becomes filled up with spongy osseous tissue.

In his splendid and well-known work on fractures and dislocations, Malgaigne examines the different theories of

this lesion, which had been propounded up to date, and gives special attention to three—(1) The inflexion hypothesis of Nélaton, (2) the penetration theory of Voillemier, and (3) that of *arrachement*, to which attention had previously been called by Voillemier and others, but to which Malgaigne accords a position of importance to which it had not till then been elevated.

In 1851 Verneuil published the results of a large series of experiments on the dead body, with the view of deciding the conditions which led to the establishment of the characteristic deformity; and especially of the abduction. They had led him to believe that this feature could not exist without previous laceration of the triangular fibro-cartilage, or breaking off of the ulnar styloid process.

In 1852 Fouchet presented a number of specimens of this lesion to the *Société Anatomique*, and announced his belief that the mechanism of the fracture was usually that of *arrachement*. Impaction may take place, but he does not look upon it as an essential feature; and he explains the backward displacement of the carpal fragment by the *mouvement de bascule* of Pouteau.

A new and rather paradoxical theory was propounded by M. López in his inaugural thesis of 1860. According to this writer, the interosseous ligament plays the principal *rôle* in the mechanism of fracture of the lower end of the radius—the position of the solution of continuity being determined by the absence of that supporting membrane from the bone towards its carpal extremity.

M. Lecomte, who undertook the refutation of the thesis of M. López, adopted definitely the theory of *fracture par arrachement*. He combats the idea of Nélaton that the radius gave way because it was placed between two opposing forces; and believes that the supporting columns which Nélaton described do not come to press against the surface

of the ground at all. This statement he attempts to prove by the simple experiment of marking with ink on the palmar surface of the wrist the respective prominences formed by the pisiform and trapezium bones. When this marked hand was placed in an extended position on white paper the mark of the pisiform was never impressed on the surface. According to the opinion of this observer, the most important factor in the *arrachement* of the lower end of the radius is the anterior radio-carpal ligament. Divide this ligament, and no degree of subsequent extension of the hand will affect the continuity of the lower end of the radius; but the fracture is not produced by forcible flexion even when this ligament has been left intact. Impaction may or may not exist; it is not by any means an essential feature. He agrees with Jarjavay that the preservation of the posterior periosteum is a source of subsequent deception, as it leaves a space for the formation of a deposit of new osseous tissue between it and the underlying surface of bone; which would subsequently give rise on section to the appearance so suggestive of penetration by the upper fragment even where this had never occurred.

The ablest and the most uncompromising of all the opponents of Voillemier's views of the mechanism of Colles's fracture was our distinguished fellow-countryman, Professor R. W. Smith, of the University of Dublin. In his very valuable work on "Fractures and Dislocations," he upholds with the greatest firmness the opinion that the doctrine of fracture with penetration is untenable; and that the ingenious French surgeon had allowed himself to be too easily imposed upon by the fallacious appearances sometimes presented by consolidated fractures of the lower end of the radius. Smith believed the occurrence of any appreciable degree of impaction in these fractures, while the ulna remained unbroken and the ligaments connecting

its lower end with that of the ulna still intact, to be a physical impossibility. He explains the presence of Voillemier's demonstrative line of compact tissue by subperiosteal osseous deposition; while he points out another fact of great significance which seems to have escaped the notice of all previous observers—that the distance between the lamina of compact bone and the posterior surface of the lower fragment does *not* correspond to the extent of the backward displacement of the latter, as it should if the hypothesis of the French surgeon were correct. He also points out the important fact that the length of the supposed penetrating line of compact tissue does *not* correspond to the amount of posterior shortening of the radius. The thickening of this layer, which Voillemier himself had found to exist in old fractures, and which he was obliged to confess his inability to explain, Smith readily accounts for by the deposition of new osseous matter. The deformity so characteristic of this familiar fracture is referred by him to muscular action. The preternatural mobility and crepitus which are supposed to be characteristic of solution of osseous tissue, and which are usually so obscure in this case, can, he believes, always be obtained after having used sufficient extending force to reduce the deformity. The plane of fracture Smith believed to be transverse—at least in the great majority of cases; and, even in the rare instances in which it is oblique, he does not admit the possibility of over-riding of the fragments.

Of the subsequent contributions to the literature of Colles's fracture, one of the most interesting is that of Chiene, of Edinburgh. To a description of the dissection of a recent specimen, this accomplished surgeon adds some ingenious remarks on the nature of the mechanism by which the solution of continuity is produced. In falling on the hand, the force, which is received chiefly by the

ball of the thumb, is transmitted through the carpus to the lower end of the radius. The nature of the resulting lesion will then vary with the angle of inclination which the forearm makes with the surface of the ground. If this be less than 60° the line of force travels upward *anterior* to the axis of the forearm, and the whole shock is borne by the lower end of the radius, which gives way near its carpal extremity. But if, at the moment of impact, the angle of inclination be greater than 60°, then the line of force, instead of passing in front of, passes directly up, the arm; and "the usual result is either a severe sprain of the wrist or a dislocation of both bones of the forearm backwards at the elbow-joint."

Chiene admits the existence of a slight degree of penetration in many cases, but not sufficient to justify the application of the term *impaction*; by which he would understand the condition of parts in which the distortion cannot be removed by the use of justifiable force. Such slight penetration did exist in the specimen which formed the text of his communication, and the thin slice of bone—much deeper behind than in front—which had been separated from the carpal end of the radius, was found to be divided into three fragments by two vertical fissures. The tip of the ulnar styloid process was also found broken off, but the triangular fibro-cartilage had preserved its attachments. The inferior fragment, in addition to the backward displacement and partial rotation on its transverse axis, was found to have undergone the form of rotation which had been specially described by Goyrand—in the arc of a circle whose centre is placed at the ulnar attachment of the triangular fibro-cartilage.

Dr. Gordon, of Belfast, found, as the result of the examination of twenty-seven old specimens of Colles's fracture, that the distance of the line of fracture from the carpal

articular margin varied, posteriorly, from three-eighths to one three-quarter inches; and anteriorly, from a quarter to two inches. In nineteen cases the fracture was oblique from before backwards. In the other eight the plane of separation was directly transverse. To the question of the existence of impaction he paid no attention; but he argues very strongly in favour of the "cross-breaking" mechanism of the fracture, produced by the strain of hyperextension. The idea that the solution of continuity is produced by violence transmitted through the carpus he summarily rejects; as he believes that if this were the true explanation the fracture would be found to radiate from the point struck.

Among the English surgeons of comparatively recent years who have taken up the question of the mechanics of Colles's fracture, the most emphatic in expression of opinion was, perhaps, the late Mr. Callender, who surpassed even Voillemier himself in the vehemence with which he advocated the hypothesis of impaction. Basing his belief on the evidence afforded by the dissection of three specimens, in each of which the fracture had been produced by very extreme violence, he considers that "there can be no question but that impaction is the cause of the displacement."

The only indisputable evidence which can be collected on the much-vexed question of impaction is that derived from the examination of recent specimens. Of the records of such, Dr. Wight, of New York, has collected a series. One is by Professor Hamilton, of that city, in which the autopsy showed the detachment of a considerable fragment from the posterior lip of the articular surface—the direction of the plane of fracture being upwards and backwards.

Two specimens were reported by Mr. Erichsen. In the first, the lower fragment was split into three portions, be-

tween which the inferior extremity of the upper fragment was firmly impacted to the depth of half an inch. The largest of the three pieces of the carpal fragment comprised the whole of the articular surface, which had remained uninjured. In the second of his cases, the injury was the result of a fall from a height of twenty-five feet; and the lower fragment, which had been separated along a transverse plane about half an inch above the articular extremity, was found to be completely comminuted.

Two other cases were examined by Professor Gross, in one of which the carpal fragment was found separated into two pieces by a fissure leading into the joint; in the other, a more extensive degree of comminution had taken place.

In an example recorded by Professor E. M. Moore, the fracture was found to be transverse; and, although crepitus could not be detected during life, there was not the slightest trace of impaction. The tip of the ulnar styloid process had been wrenched off with the internal lateral ligament of the wrist. In the second forearm of the same body, a fracture of the carpal end of the radius was found to exist; which ran in an oblique direction, from above and behind downwards and forwards. The apex of the ulnar styloid process was also broken off.

Dr. Hector Cameron, of Glasgow, has reported the results of the examination of two recent specimens. In the first, the line of fracture was transverse from side to side, and oblique from before backwards and upwards; the lower fragment being one inch in length behind, and a quarter of an inch in front. The carpal fragment was slightly comminuted; and the lower end of the upper fragment, which was extremely rough and denticulated, had sent a toothed process into the spongy tissue of the lower. This had so firmly nailed it in its new position that it required a great deal of force to separate them. In Dr. Cameron's

second case, the fracture was transverse in all directions; and was situated about an inch above the carpal extremity. In front, the break was hardly complete, the periosteum having remained untorn; but there existed a well-marked backward hingeing of the carpal fragment, and examination of the posterior aspect showed a complete solution of continuity. The compact outer layer of the upper fragment was driven (posteriorly) into the spongy tissue of the lower, splitting the latter into three pieces; which it, at the same time, held securely together—the impaction being complete and irreducible.

More recently Dr. Pilcher, of New York, advanced an entirely new theory of the nature and mechanism of fractures of the lower end of the radius. This part of the bone is formed of "a cone of cancellous tissue, which is grasped above by a cylinder of strong, thick, compact walls. All force transmitted to the lower extremity, other than that of very great intensity, is here finally decomposed and repelled." If, on the other hand, the violence be very great, the carpus acts as "a blunt wedge, driven against the concave articular surface of the radius with sufficient violence, it will split it longitudinally. There is no possibility of a cross-breaking strain being exerted; and if in any case transverse lines of fracture are found, they must have been occasioned by some other mechanism." This theory is borne out by the evidence gathered in the examination of eleven specimens of recent fracture collected in the Museum of the New York Hospital, and one in the possession of Professor Hamilton. Ten of the twelve present both vertical and transverse lines of fracture. In some, the vertical fissures extend into the shaft above the level of the transverse solution of continuity. But the most remarkable corroboration of this writer's view was afforded by a specimen presented to the Boston Society for

Medical Improvement by Professor Bigelow, in 1858. In this injured radius, the carpal articular surface presented a star-shaped crack; from which corresponding fissures passed up into the shaft for more than an inch, but without transverse fracture. It was the second specimen of the kind that had been met with by Professor Bigelow.

In drawing this communication to a close, I will just observe that an examination of all the facts and theories which I have collected regarding this subject must, I think, leave no doubt on the mind of the intelligent inquirer that a great variety exists both in the form and probably also in the mechanism of the production of the fractures of the lower end of the radius. At the last meeting of this Section a most interesting specimen of the rare occurrence of fracture in this position, with *forward* displacement of the carpal fragment, was exhibited by the ex-President of the Royal Academy of Medicine, Professor E. H. Bennett. Not long since I had an opportunity of examining the wrist of an elderly lady which displayed the typical deformity of an unreduced "Colles." The accident had happened in her youth. She fell backwards on the ice in skating, and had tried to break the fall by reaching her hand behind her. It, accordingly, first sustained the shock of the fall, palm downwards, in contact with the ice. The diagnosis was that of a sprain, and she was treated accordingly. The specimen which I have had the honour to exhibit still retains a portion, at least, of the original displacement. It also presents the slight peculiarity of having sustained the solution of continuity at a somewhat higher level than usual—approximately at the "specific distance" meted out by Abraham Colles himself. Most of my hearers, I am sure, are aware that the great Dublin surgeon whose name is associated with this lesion never had an opportunity of dissecting a

recent specimen of his own special fracture. Accordingly, as the appearances of the recent specimens are deceptive, he located the lesion at a distance of an inch and a half from the carpal extremity. The future of such discussions regarding fracture will, of course, be made much shorter and more luminous by the use of the X-rays. There will be fewer hypotheses, and more satisfactory diagnosis and treatment. The innumerable expressions of opinion regarding the features of Colles's fracture are suggestive of the travellers' hot dispute regarding the colour of the chameleon. In this connection, Professor E. H. Bennett, probably the highest authority on the subject now living, has well observed that "we have ample proof that the simple transverse fracture without impaction, the impacted, and the *fracture par écrasement*, with a shattered lower fragment, are all possibilities." And there can be no reasonable doubt that modifications of the mechanism of production exist in corresponding variety. I have not myself come forward as the advocate of any one hypothesis, for I do not believe that any one can be successfully manipulated so as to adapt it to all cases; nor do I attempt to broach any new theory, for I think there is no room left for further innovation, and the theories with which we are already acquainted will, when judiciously applied, be found amply sufficient. I must, accordingly, close with an apology for trespassing so far on the time and patience of the members of the Pathological Section. I have been encouraged to do so by the belief that even a hasty summary of our knowledge of the subject would be favourably listened to by the compatriots of the three surgeons to whom we are indebted for the original description and the soundest teaching on the subject—Abraham Colles, Professor R. W. Smith, and Professor E. H. Bennett.

NOTES ON A CASE OF OSTEOID CHONDRO-SARCOMA OF THE FEMUR, TREATED BY DISARTICULATION AT THE HIP-JOINT; WITH EXHIBITION OF SPECIMEN, PHOTOGRAPHS, AND MICROSCOPIC SPECIMENS.

By C. YELVERTON PEARSON, M.D., F.R.C.S.;
Professor of Surgery, Queen's College, Cork.

[Read in the Section of Pathology, May 2, 1902.]

C. C., aged fifty-eight years, farmer, fell from a ladder on his heels nearly eight years ago; heard something give way at the knee, and was unable to stand for three weeks. After this he got about his business as usual. Two years after he got another fall from a ditch. This was followed by pain above the right knee; and a tumour, at first about the size of a marble, was noticed during the following twelve months. Four years ago—*i.e.*, two years after the second fall—he had to get his trousers enlarged in consequence of the swelling. Two years after this he was admitted to the North Infirmary under the late Dr. O'Sullivan, when amputation was advised. This he declined at the time for family reasons, and returned home. He was re-admitted August 16th, 1901, and prepared to submit to amputation, the tumour having steadily increased and the limb having become very painful.

Present Condition.—Has a large, irregular swelling, occupying the lower two-thirds of the right thigh, some portions of which feel very dense. Circumference of tumour at widest part = 31 ins.; of limb above = 21 ins.; of limb below = 17 ins. There is marked mapping of the veins, which are much enlarged, on the inner and anterior aspect. A rose-coloured rash of a lichenous character, consisting of groups of papules with intervening hyperæmic skin, is present on the lower portion of the swelling, at the inner side of the knee-joint. The leg below is considerably swollen and œdematous. The appearances are well illustrated in the accompanying photograph. The glands in the groin are con-

siderably enlarged and of stony hardness. The patient's health was good, and no evidence of other disease was present. Amputation at the hip-joint was performed on August 22nd.

Operation.—A vertical incision, 4 ins. in length, commencing a little below Poupart's ligament, was made over the femoral vessels. The common femoral artery and vein were ligatured, then the superficial and profunda arteries and veins. The vessels were then divided between the ligatures. The enlarged lymphatic glands were now dissected out from the groin. The amputation was completed by a rachet-shaped incision. The various vessels were secured with compression forceps as divided, no tourniquet or digital compression being employed.

The progress of the case was most satisfactory for the first three or four days, but subsequently the dressings became

contaminated with urinary and fæcal discharge, and suppurative inflammation took place, in consequence of which the patient made a slow, though very satisfactory, recovery.

Pathological Report by Dr. A. E. Moore:—"The tumour consists chiefly of cartilage, but contains sarcomatous elements and some extensive ossific centres. Microscopic examination shows that some parts are composed exclusively of large cells; in other parts the process of ossification in cartilage is well displayed, while some sections leave no doubt of the sarcomatous nature of the growth. Judging both from the appearance and the history there is no doubt that the tumour originated as a periosteal chondroma, and subsequently developed malignant characters. Examination of the glands removed from the vicinity of the common femoral vessels showed that they contained calcareous deposit and large cartilage cells, the nuclei of which exhibited the phenomena of karyokinesis, and leave no doubt as to the glands being the seat of secondary deposit."

Remarks.—The chief points of interest in this case to my mind are:—

1. The traumatic origin, which seems so frequent in the case of sarcomatous growths, and especially of those affecting bone.

2. The infection through the lymphatic system.

3. The long period which elapsed from the origin of the tumour before it took on a malignant character.

4. The subsequent history of the case, which shows that the infection had travelled beyond the region of operative interference, as a few weeks ago the patient was re-admitted to the infirmary suffering from severe pain in the abdomen, which, on examination, was found to be due to the presence of a large tumour in the epigastrium, which had a well-marked impulse transmitted from the aorta, and is, I have no doubt, the result of secondary implication of some of the lumbar lymphatic glands.

5. The method of amputation adopted, which provided

for ligature of the main vessels and extirpation of the glands previous to disarticulation, and which dispensed with the use of tourniquet or other special methods of controlling hæmorrhage in what is justly regarded as the most formidable of amputations.

PROFESSOR MCWEENEY said that sarcomata are usually infective through the blood current, though cases are on record showing that the lymphatics sometimes convey the infection. In his experience the enlarged lymphatics usually disappear after operation. The cells seen in the section exhibited by Professor Pearson are remarkable, being large, cartilaginous, with active nuclei.

PROFESSOR BENNETT congratulated Professor Pearson on the successful removal of such a large osteoid sarcoma. He found that such growths taking their origin from the periosteum are, as a rule, of the more malignant type. The case is further interesting from the considerable time the tumour existed before it gave evidences of malignancy, and it is much to be regretted that the poor man did not get operated on years before he did. Malignant tumours of this character usually infect the abdominal organs, but the most frequent site of infection is the lung.

DR. BLAYNEY desired to draw attention to some very interesting statistics of the recurrence of sarcomata that have recently been published, showing a percentage of ninety. The prognosis is decidedly bad in such cases. It has, however, been recorded in the paper to which he has referred that cases in which suppuration occurred had a smaller percentage of recurrence of the disease than any others; and some surgeons have recommended that hypodermics of the toxin of the *Bacillus prodigiosus* be injected into such tumours to promote suppuration, and that the production of pus during healing, after operation, be encouraged.

PROFESSOR PEARSON did not inject Coley's or any other fluid in sarcomatous tumours; he thought the methods recommended savoured of trifling with human life. He waits and watches results before adopting extraordinary measures. He omitted mentioning that all the muscle tissue of the leg below the site of the tumour had undergone colloid degeneration.

SUBCONJUNCTIVAL OSTEOMA.

By J. B. STORY, F.R.C.S.;
Surgeon to St. Mark's Ophthalmic Hospital;
Professor of Ophthalmic and Aural Surgery, R.C.S.

The tumour occurred in the right eye of a boy aged four (Bertie H.—H. C. 18. January, 1901). Immediately after birth his parents noticed a small "white blister" on the white of the eye, and they consider that it has been growing rapidly of late.

The tumour presented underneath the conjunctiva between the insertions of the superior and external recti muscles. It felt hard to the touch, was freely movable with the conjunctiva, which seemed adherent to its most prominent surface, and appeared to have a band of adhesion further back to the sclerotic. Its shape was that of a pear with the stalk pointing backwards.

On removal the front portion was found, as expected, adherent to the conjunctiva, and the under surface to the sclerotic behind. The upper surface was convex, and the under surface concave, following the curves of the lids and globe. The tumour was extremely hard, with loose, fibrous tissue over its exterior. Its size was 10 mm. by 8 mm. by 3 mm. Dr. Earl, who has kindly examined the growth, reports that—"The tumour consists of true bone, containing Haversian systems. Decalcification was effected with much greater difficulty than is usually the case with small pieces of bone. There is a small cavity containing marrow in the interior. The surface is covered by a fibrous periosteum which contains very few cells. There is no cartilage present."

The tumour exhibited is an example of an exceedingly rare affection. When the "Græfe-Sæmisch Handbuch" was published in 1876, only three cases were on record, and

the total number observed since that date does not amount to more than nine, so that this is the thirteenth case. The first case (described by von Græfe, "Zehenders Monatsblatter," 1863, p. 23) was in a young girl, and the tumour lay underneath the conjunctiva of upper outer quadrant of the globe.

Sæmisch's case occurred in a young man, and the tumour lay in precisely the same situation. Sæmisch mentions, also, a case described by Watson at the London Pathological Society, in which the tumour lay either between the insertions of the superior and internal recti or in the upper outer quadrant of the globe. The description in the "Transactions" of the Pathological Society is so carelessly written that both positions are assigned to the tumour. (Pathological Society Transactions, Vol. XXII., p. 237.)

De Wecker records a case in the right eye of a girl of twenty-six (Wecker and Landolt, Vol. I., p. 427). The tumour lay in upper portion of conjunctiva, but it is not stated whether in outer or inner quadrant.

Galtier, of Nimes, described a case in "Ann. d'Oculistique," CXIII., p. 186. The patient was a young girl, and the tumour lay in the usual position between the insertions of the superior and external recti.

A violent fall on the brow of that side had been experienced some months previously, and Galtier is inclined to attribute the osteoma to a piece of the orbital wall being fractured, and the detached bone remaining fixed in the soft tissue of the orbit.

In "Nagels Jahresbericht" for 1895 an observation of Cirincones is quoted. The tumour in this case lay in upper outer quadrant. It is stated in the notice that up till then eight cases in all were on record, and that the tumour in all the cases, except Watson's (but *vide supra*), lay in the upper outer quadrant.

Hartridge records a case in the "Trans. Ophthalmological Society of United Kingdom," which occurred in a child of three months, and which was situated in the usual position. ("Ophth. Soc. Trans.," 1895, p. 51.)

In addition to the cases already noted above he mentions a case of Lorings, observed in 1882, in an infant of eight months, and one of Vignes, in 1889, in a child of three years. Also a case described by Anderson Critchett in 1882, which had been observed three days after birth, though the tumour was not removed till the age of eighteen, and one described by Snell in 1884, the growth dating also from early infancy.

In all the recorded cases where the position is given the growth was situated in the upper outer quadrant of the conjunctiva, with the doubtful exception of Watson's. There is no satisfactory explanation, so far as I know, for the occurrence of these peculiar bony growths in this situation, but that some explanation will be forthcoming I feel pretty certain. I regret that I cannot supply the deficiency. Inasmuch as these growths are always found at birth, or immediately afterwards, we are inclined to seek for some embryological condition in explanation, but I know of none that would account for the presence of bone in this position.

Comparative anatomy, of course, affords examples of bony structures, both inside the eye and in the sclerotio, as well as outside the eyeball on surface of sclerotic, but these are not present in mammals, and we should have to go as far down the vertebrate scale as the bony fishes before meeting with a structure similar to what forms the subject of this communication. In the human eye bone is certainly found as a definitely pathological formation secondary to destructive inflammatory changes. The subconjunctival osteoma, on the contrary, must be classed as a teratoma.

SECTION OF STATE MEDICINE.

THE REGISTRATION OF DISEASE.

By NINIAN M'I. FALKINER, M.D., Univ. Dubl.; F.R.C.P.I.;
Diplomate in State Medicine, Univ. Dubl.;
Medical Superintendent of Statistics in the Office of the Registrar-General for Ireland.

[An Address delivered at the Opening Meeting of the Section of State Medicine, February 14, 1902.]

It has been the custom for the President of this Section to give an Address at the opening meeting. I purpose doing so, following humbly in the footsteps of the distinguished members of the profession who have preceded me, amongst whom the names of Sir Charles Cameron, the late Registrar-General (Dr. Grimshaw), Dr. A. W. Foot, and Sir J. W. Moore, are closely connected with all the efforts that have been made to develop the cultivation of sanitary science in this country.

The name of Dr. T. W. Grimshaw awakens in me feelings that are more or less of a personal character, as his death—alas! too early—resulted in a change in the nature of my professional duties; and I venture here to take the opportunity of thanking the members of the medical profession, collectively and individually, for the help they gave, and the kind interest they took in my promotion to a position which includes among its duties the revision of the Medical Statistics of the country, under the able chieftainship of Dr. Matheson, the present Registrar-General for Ireland.

Before proceeding to the subject of my Address I venture to offer a summary of the work which has been carried out by this Section during the past ten years, during which I had the honour of acting as secretary—that is, from 1891 to 1901.

Ordinary meetings	-	20
Special meetings	-	5
Council meetings	-	61
Average attendance	-	25

SPECIAL MEETINGS.

(1) 1892—Drs. Donnelly and Laffan. "The Grievances of Dispensary Medical Officers."
(2) 1895—"*Re* Verdict against Dr. Hadden."
(3) 1895—"Infectious Diseases Hospital Scheme."
(4) 1897—"Convalescent Home for Infectious Diseases."
(5) 1898—"To try and get through unconcluded business."

RESOLUTIONS SENT TO COUNCIL.

Re Oaths Act. Hon. Sec. General meeting.
Re "Surplus Funds." Dr. Donnelly. Council meeting.
Re Infectious Diseases Hospital.
Re Convalescent Home for Infectious Diseases. General meeting. Sir C. Cameron.
Re Grant to Sanitary Congress, 1878.
Re "Tuberculosis Congress." Dr. T. W. Grimshaw.
Re To hold a General Meeting of Academy on Prevention of Tuberculosis. Council meeting.
Re Sub-Committee to Investigate Distribution of Cancer in Ireland. Dr. Martley.
Re Central School of Pathology in Connection with Lunatic Asylums. Dr. Dawson.
Re Notification of Tuberculosis. Council meeting.
Re Infant Feeding. Dr. G. P. Cope.

PAPERS.

During this period I had the pleasure of making communications on the following subjects to the Academy:—

1891—The Fifth Year of Medical Education.

1892—Should Primary Syphilis and Tubercular Phthisis be Notified under the Infectious Diseases Act?

1893—Note on a Question of Public Health.

1893—The Oaths Act, Cap. 46, Sec. 5.

1894—Public Practice.

1894—Primary Syphilis in Young Children.

1895—The Education of Sanitary Sub-Officers.

1895—Small-pox in a Family, containing members vaccinated, re-vaccinated, and unvaccinated.

The Presidents that I had the honour of serving under were:—1891-3, Dr. E. MacD. Cosgrave; 1893-5, Dr. Edgar Flinn; 1895-7, Dr. J. M. Redmond; 1897-9, Dr. H. C. Tweedy; 1899-01, Sir C. Cameron, C.B.

From these statistics I, therefore, claim the share this Section had generally, (1) in promoting the interests of Public Health in Ireland, (2) the foundation of the Beneavin Convalescent Home, (3) the organisation of the Dublin Congress on Tuberculosis, and (4) the successful endeavour to gain an introduction into Act of Parliament to enable Dr. Dawson's scheme for formation of a Central School of Pathology in connection with Lunatic Asylums in Ireland to be carried out.

The Registration and Notification of Sickness was brought before the public by Dr. Arthur Newsholme in a paper read before the Royal Statistical Society of England in the year 1895, from which I have borrowed the following abridged history. In this paper he pointed out that mortality is not necessarily a correct index to the morbidity of a community. Mortality statistics necessarily ignore everything that precedes the close of life:—

The history of the attempts which have been made to establish a National Registration of Sickness appears to have originated with Mr. John Bellers in the beginning of the 18th century. It was again urged in 1732 by Dr. Clifton, Physician to the Prince of Wales, with special reference to hospitals. Dr. Rumsey, in 1844, in his evidence before the Medical Poor Relief Committee of the House of Commons, suggested a comprehensive plan for the uniform registration of the sickness which affects the poorer classes. Dr. Liddle, subsequently Medical Officer of Health for Whitechapel, proposed amended forms for the weekly medical returns, made by their medical officers, to the Boards of Guardians, and the utilisation of these returns in general sanitary inquiries. About the same time it was suggested in the *Sanitary Review* by Sir B. W. Richardson that these returns might easily, with a few obvious modifications, be employed as a basis for the National Registration of Disease, especially as a record of epidemics. This article further suggested the appointment of a Registrar-General of Diseases in London as the central authority, to whom the district returns after local use should be forwarded for digest and publication.

Dr. B. W. Richardson was, however, the first to carry any scheme for notification and registration of sickness into actual practice. The work he had performed with his 44 volunteer observers was tabulated in the "Journal of the Public Health and Sanitary Review" for 1855. In 1857 the work was taken up by the Metropolitan Association of Health Officers. The returns were furnished voluntarily and gratuitously by the respective medical officers of hospitals and dispensaries—the general Board of Health undertaking to print the returns.

In 1858 this effort collapsed. In 1860 Dr. Ransome organised an effort by means of the Sanitary Association of Manchester and Salford. In this report the number of

deaths among the cases reported were stated. From this the work was taken up by the Social Science and the British Medical Association, as the result of a paper read on the subject by Dr. Rumsey. A committee was formed of the former Association, composed of Drs. Acland, Farr, Greenhow, Southwood Smith, and Messrs. John Simon and Edwin Chadwick.

At a meeting of the Lancashire and Cheshire Branch of the British Medical Association, held on 24th of October, 1862, it was resolved that a sub-committee be appointed "to consider and report on the best means of carrying out the registration of disease in large towns." A committee of the whole British Medical Association was appointed in 1865, at the instance of Dr. Ransome, and for ten years he prepared valuable reports.

In Dublin the British Medical Association adopted the form proposed by the committee appointed in 1868 for the uniform registration of disease. In 1869 Dr. B. W. Richardson headed a deputation who waited upon the President of the Poor Law Board. Mr. Goschen received this committee, and agreed with them on the importance and utility of the work, but pointed out that care should be taken not to impose additional labour on the poor law officers, and that the nomenclature of disease used should be uniform. The committee recommended that a deputation of the British Medical Association should also seek an interview with Mr. Goschen, and should be instructed to state: (1) The importance to the public and to science of such a registration of disease; (2) the success of the scheme adopted by this Association; (3) that the method adopted provides for a uniform nomenclature of disease; (4) that it need not entail any additional labour on the poor law medical officers; (5) that the appointment of registration officers (medical) would not only facilitate the registration

of disease, but would greatly improve other sources of State Medicine.

At the meeting of the British Medical Association in 1870 a deputation, consisting of Drs. Rumsey and Ransome, was appointed, who again interviewed Mr. Goschen, who referred them to a Royal Sanitary Commission, whose report appeared in the spring of 1871. Nothing practical was the outcome of their labours.

The British Medical Association continued the crusade, and a memorial was presented to the President of the Local Government Board in 1874, a petition for a national system of "Registration of Disease" being laid before the House of Commons by Dr. (now Lord) Playfair.

In the supplement to the thirty-fifth Report of the Registrar-General for England, Dr. Farr, in reference to the registration of sickness, says: "What is wanted is a staff officer in every county or great city with clerks to enable him to analyse and publish the results of the weekly returns of sickness."

Whatever may be said as to the possibility of this elaborate, ambitious, and perhaps inconsiderate scheme, as regards the over-worked medical practitioners, on whom was placed the burden of performing the work as a voluntary tribute to the State, those, and the others who preceded them and helped them, no doubt deserve the credit of the Act which was passed in the year 1889.

I do not propose in any way to criticise the administration of this Act, and content myself by offering, with the kind permission of the Registrar-General, the summaries of the notification reports which were published in the weekly returns which were issued from his department in the year 1901.

TABLE *showing, for the Year* 1901, *the Number of Notifications of, and the Number of Deaths from, the undermentioned Diseases, with the Annual Rates per* 1,000 *of the Population represented by Total Notifications and Total Deaths, respectively, for Dublin City, Rathmines Urban District, Pembroke Urban District, and Belfast City.*

Cities, &c.	Population, middle of 1901	Notified Cases of						Total of the foregoing	Annual Rate per 1,000 of population	Deaths from						Total of the foregoing	Annual Rate per 1,000 living
		Small-Pox	Scarlet Fever	Diphtheria*	Typhus Fever	Enteric Fever	Continued Fever			Small-Pox	Scarlet Fever	Diphtheria*	Typhus Fever	Enteric Fever	Continued Fever		
Dublin City -	291,190	—	528	196	31	817	200	1,772	6·1	—	21	32	3	85	6	147	0·5
Rathmines -	32,722	—	84	27	—	47	17	175	5·3	—	5	3	—	8	—	16	0·5
Pembroke -	25,844	—	45	29	1	45	17	137	5·3	—	2	7	—	3	3	15	0·6
Belfast City -	351,083	5	369	434	15	2,526	1,350	4,699	13·4	1	13	65	8	341	26	454	1·3
TOTAL -	700,839	5	1,026	686	47	3,435	1,584	6,783	9·7	1	41	107	11	437	35	632	0·9

* Including membranous croup.

In summarising the returns of notification from the sanitary areas who favour the Registrar-General with the information—namely, Dublin City, Belfast City, Rathmines Urban District, and Pembroke Urban District—I found that the diseases known at present in the reports of the Registrar-General as the principal zymotic diseases, were not uniformly notifiable in all these districts. For instance, measles is notifiable in Dublin City and Pembroke Urban District, but not in Belfast City or Rathmines Urban District; so that my statistics deal only with those diseases in which there is a uniformity of action as regards the sanitary authorities. I do not, of course, want to claim for this table any precise statistical value, but it does demonstrate the fact that, with uniform and extended notification, and collection and registration of these facts, important information would be gained.

In conclusion, I may say that as a sanitarian and a statistician I deplore that I have not the information that would enable me to present these unambitious tables in a more complete form. I would like to be able, even for these four areas, to give correct statistics of the relation of mortality to morbidity, for all preventable diseases, including tuberculosis, also for influenza and cancer. Under the Act of 1889 sanitary authorities have the power of paying for this information, and in certain instances they hesitate to do so. Can that hesitation be removed by assuring them that by so doing they will obtain all information as to the existence of preventable diseases, and also will accurately gauge the relation of the mortality to the morbidity of any disease?

Mr. D. E. Flinn expressed regret that some districts in the Dublin Registration Area had not yet adopted the Notification Act. Had the statistics of the whole area been available for

analysis, the address would have been even more valuable. In his experience rural councils were more readily impressed with the value of notification of infectious diseases than urban councils, who seemed to see nothing in the Act other than increased expenses.

DR. THOMAS DONNELLY said that Sanitary Authorities shrank from the expense of preventive measures because they failed to recognise that the expenditure on prevention is practically nothing compared to that which an epidemic would entail. An account of the relative proportion between morbidity and mortality in cases of infectious diseases would be highly interesting and very valuable. Registration of death is at present very accurately carried out, but he feared that a considerable percentage of infectious diseases is not notified. Some, especially the medical officers of health, are very particular in notifying the diseases made compulsory, and many of them, like himself, voluntarily notify phthisis. As a rule, he finds that the poor, once they know the object in notification, raise no objection to the carrying out of the Act.

DR. F. C. MARTLEY considered that one of the principal difficulties they have to contend with is the getting of statistics. By writing to the medical officers and other officials of English working-class societies, he tried to learn something of the morbidity and mortality of such; but in some the lives were so carefully selected by the medical officers that the results were inconclusive.

DR. CRAIG felt that phthisis should be included in the list of infectious diseases to be notified to the Public Health Authorities. Some years ago, some of the Corporation of Dublin officials gave him to understand that phthisis would be included, but it has not been. Many physicians notify the presence of the disease. But what good comes of it? Some leaflets are sent to the infected house, and a coat of whitewash is applied, and then everything relapses into its old dirty insanitary condition.

DR. KIRKPATRICK thought that the public ignorance of the infectious nature of the disease is largely due to hospital physicians putting phthisical patients into general wards. Seeing this, the public cannot believe the disease to be infectious.

MR. H. G. CROLY said that if the members of the medical profession are convinced of one thing more than another, it is that phthisis is infectious. And one proof of the good such conviction does is the notice in tramcars prohibiting spitting—a habit be-

gotten of laziness. He fully approved the suggestion that phthisis should be included in the list of notifiable diseases. How much better prevention is than cure, is well shown by the good results attending re-vaccinations during the epidemic of small-pox twenty years ago.

Dr. J. P. Doyle would like to see syphilis included in the list of diseases to be notified—it is both contagious and infectious, and modifies all other diseases.

Dr. Magennis hoped Dr. Falkiner would continue to compile such statistics, as they would certainly benefit humanity and be helpful to sanitary reformers.

Dr. Falkiner, in reply, said that phthisis was freely disseminated by patients in the last stage of the disease travelling about in public conveyances. Some years ago, in a paper read before this Section, he advocated the notification of primary syphilis. He would be glad to see the literature of the Tuberculosis Congress spread about. Medical men might give it a place on their waiting-room tables; the public must be educated to see the value of Preventive Medicine.

NOTES ON A CASE OF LEAD POISONING.

By R. B. M'VITTIE, M.D.

[Read in the Section of State Medicine, May 25, 1902.]

A RETIRED Indian Officer, aged about fifty-eight, who had always enjoyed fairly good health in India with only occasional slight attacks of fever, settled with his family in a fine country house most healthfully situated. In about three months' time he began to complain of some general seediness, loss of appetite and muscular weakness, which he attributed to having over-exerted himself, being always a man of unusually active habits. A month later he suffered from occasional very severe attacks of abdominal pain, with increasing nausea and loss of appetite.

After a residence of six months he was seized with the first really violent paroxysm of vomiting, abdominal pain and constipation, the remaining members of the family being all in good health. From this attack he made a partial recovery, and was able to take a little food, and get about again. He now began to observe what he described as a "fumblyness" about his hands, especially the right, and became unable to button his clothes or write a letter. He was supposed to have gout by some medical men who saw him, and was ordered to Buxton, where he underwent treatment with baths and waters from which he derived very little, if any, benefit, although perhaps the change effected some improvement in his appetite.

He had returned to his residence when I saw him, and was taking thialion. He had right wrist-drop, but having lost all his natural teeth during the Burmese campaign, there was

no line on the gums. He still had occasional attacks of nausea and a tendency to constipation; he, however, could sometimes take his meals pretty well, but always observed that the soup increased the nausea, and was unnaturally depressed and irritable.

The water supply was examined, and I found it to be supplied from two wells situated in a field above and behind the house at a distance of about 100 yards. The pipes from the wells appeared to be iron, but in the house the tap from which most of the water was drawn was attached by a few feet of lead piping to the main coming from the wells, and water taken in the morning from this tap contained, according to Dr. Lapper's analysis, 1·67 grains of lead, while that taken direct from the well contained no lead.

Since this discovery he has used water taken directly from the wells with complete restoration to his general health, although the right hand has not yet fully regained its power.

The disastrous consequences of resting satisfied with an incorrect diagnosis are forcibly brought home to us here, for while this poor man was supposed to have gout he was continuing to poison himself every day, and was going rapidly down the hill.

It is remarkable that one member only of a large household should suffer so severely while the others escaped any manifestations of injurious effects. This was probably explained by the facts that he was the oldest member of the household by a good deal, and that having been exposed for many years to the injurious influences of the Indian and Burmese climates, his eliminatory organs were probably not in as active a condition as those of the other members of the household; and further, that he probably consumed more water per diem than any of the others, as it was his custom after active exertion about the place to come in and take large draughts of water with whiskey in them.

The nausea after the soup is interesting, and may perhaps be explainable from the fact that soups are usually made by a prolonged process of simmering or slow boiling, and that in this way by evaporation a certain amount of concentration would result by which he would take a larger quantity of lead in a given quantity of fluid.

SIR C. CAMERON, C.B., considered Dr. M'Vittie's communication of interest from the exceptionally large amount of lead present, greater than is usually found except in the case of acid solutions. The water pipes used in Dublin consist of an alloy of tin, 3·5 per cent., and lead, 96·5 per cent. This has, after years of trial, been found to resist the solvent action of water.

PROFESSOR MCWEENEY said that the case is interesting from many points. We find that a few feet of lead pipe yields to a soft water an unusually high percentage of lead. How could it produce this effect? He is inclined to think that the two metals, the iron and lead, generated electricity, the presence of which produced the solution of the lead. From the clinical history, which says nothing of the patient's urine, he is disposed to think that the patient had some inherent peculiarity of constitution. He (the patient) may have had some chronic kidney disease. An examination of the interior of the lead pipe would throw some light on the subject; they would, at all events, see if there were any carbonates deposited.

DR. DE LISLE, of New Zealand, said that in New Zealand lead poisoning was practically unknown. He had seen two cases only, and they were painters. He ascribed the immunity to the hardness of the drinking water in their towns. But before he settled in the country, during his life in Sydney, whilst lying ill with typhoid in the General Hospital of that city, he saw many cases, the victims being heavy beer drinkers, and the liquor was contaminated with lead from the leaden pipes of the beer machine. The drunkards of Sydney are beer drinkers; their moderate drinkers take whisky.

DR. FALKINER reminded the members present of the very interesting meeting of the Section in 1893, when Dr. O'Carroll

brought the subject of lead poisoning from hair dyes under notice. Lead, as many of them no doubt knew, was found in water derived from mineral sources. Of this nature was the Pudsey poisoning outbreak that caused so much excitement in the past. He felt sure that not infrequently cases of lead poisoning escaped notice in their early stages, and it is all the more creditable to the physician who diagnoses such cases in their early stage.

CONCLUDING REMARKS ON THE INFECTIVITY OF THE MILK OF COWS WHICH REACT TO THE TUBERCULIN TEST, BUT ARE NOT CLINICALLY TUBERCULOUS.

By E. J. McWEENEY, M.A., M.D., D.P.H.;

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Bacteriologist to the Local Government Board for Ireland, &c.

[Read in the Section of State Medicine, April 25, 1902.]

MILCH cows are very liable to tuberculosis. A paper which I had the honour of laying before this Section last Session (Trans. R. Ac. Med., Vol. XIX., p. 355) shows that in some parts of Ireland about one-half, in others between 80 and 90 per cent., of even the best class of these animals are affected. In England the number is probably not much, if at all, less, whilst in Germany, according to Ostertag, the leading authority, the proportion of tuberculous milch cows is about seven out of every ten.

The question whether the milk of such cows contains the virulent bacillus of the disease is, therefore, one to which an answer is urgently needed. In this country enormous numbers of children are fed on such milk in the raw state, without attempt at sterilisation. Many adults, more especially invalids, subsist, to a large extent, on cow's milk. Even if we adopt the view put forward last year by Koch and regard the bacillus that occurs in the bovine race as different from that which attacks human beings, still there is the fact that young calves have to be fed upon milk until they can assimilate green food, and that pigs are very largely fed on skim milk. Both calves and pigs appear to have

become increasingly liable to tuberculosis of late years, and this has been attributed to their receiving the virulent bacilli in their food. If, therefore, we wish to protect these animals from a disease that diminishes their value for breeding purposes, as well as for human consumption, it becomes necessary to inquire into the question whether the milk of tuberculous cows contains the virulent bacillus.

For the purpose of answering this question it will be well to divide cows affected with tuberculosis into three classes. First, those that have the disease in a clinically recognisable form—that is, presenting symptoms such as fever, cough, loss of flesh, diarrhœa, which would be readily recognised by a veterinary surgeon, or even by an experienced cow-keeper. Such cows are often called *piners*. A second class comprises cows that have the disease in the udder, in the form of lumps or knots, or a diffused fibrous hardness in one or other of the quarters. Of course, the same cow might be in both these classes; but, as will be seen immediately, this does not diminish the practical value of the classification. The third class comprises all the cows that present no clinical evidence of tuberculosis, that appear, in fact, to be in excellent health, but react to the tuberculin test with a rise of temperature. These animals are usually affected with the disease to a slight extent only, and it could not possibly be detected during life were it not for the extremely delicate touchstone provided by the tuberculin test. Numerically, these cows comprise the vast majority of tuberculous cows, and, in all probability, the majority of all milch cows in the United Kingdom and Germany. A careful description of the nature of the lesions found *post mortem* in such animals is contained in the article to which reference has been made above.

Now we have to determine the infectivity of the milk of each of these classes of cows. Class II. admittedly yields milk containing large numbers of virulent bacilli. All ex-

perimenters are agreed on that point. Fortunately it is a small class.[a] Out of 100 tuberculous cows selected at random one might expect to find up to four affected in this way. As many as 10 per cent. of tuberculous udders has lately been recorded by M'Lauchlan Young.[b] About 2 per cent. is the proportion commonly stated for Great Britain. Such milk is so infective that an ounce of it added to a gallon of healthy milk and fed to a young pig has sufficed to give the animal fatal tuberculosis of the alimentary canal.

The question as to Class I. is more difficult. Its answer depends upon the view taken as to the possibility that tubercle bacilli circulating in the blood may be excreted by a mammary gland (udder) that remains healthy, or, at any rate, shows no clinical existence of tuberculosis. Adami and Martin (No. 1, pp. 10 and 28) are inclined, on the strength of their own work, to hold the view that such excretion may be carried out by a healthy udder. Rabinowitsch (Nos. 25 and 26) also holds that in cases of generalised tuberculosis the milk may contain tubercle bacilli, even though there is no clinical evidence that the udder is diseased. Ostertag (No. 22, p. 454) endeavoured to reproduce the conditions experimentally. He took a healthy cow and injected into its veins a strained emulsion of tubercular material containing numerous bacilli. On the day of the injection, and for eleven consecutive days afterwards, the milk of the cow was collected, centrifuged, and the sediment injected into two guinea-pigs, without a single

[a] Lungwitz examined no less than 17,202 slaughtered cattle with the special object of determining the frequency of tuberculosis of the udder. He found that organ affected in 119 cows, 92 of which were the subject of generalised tuberculosis. The remaining cases, with two exceptions, presented tuberculous disease in several other organs, and in one of the two exceptions the bronchial, in the other the mesenteric, glands were affected. Hence, *primary* tuberculosis of the udder must be extremely rare (Arch. f. Wissensch. u Prakt. Thierheilk. Bd. 23, 1897, p. 49).

[b] University of Aberdeen, Department of Agriculture. Report of Supplementary Investigations with regard to the Value of Tuberculin, &c., by J. M'Lauchlan Young, F.R.C.V.S., F.R.S.E., 1902.

positive result being obtained. The cow itself was killed on the eleventh day and found to be suffering from acute miliary tuberculosis, the result of the injection.

This result would require abundant confirmation. So far as it goes, it shows that a healthy udder is not permeable to tubercle bacilli contained in the circulating blood, even in cases like Ostertag's, where that fluid was literally flooded with the bacilli. In view, however, of the fact that the sputum, and, above all, the manure, and even the vaginal mucus of severely affected cows may contain the bacilli, and that the milk then becomes liable to infection in the act of being withdrawn from the animal, it will be proper to regard such milk as liable to convey the infection. The class of cow in question is one, however, which no experienced stock-keeper would keep on hands, as its staring coat, cough, and diarrhœa would attract attention, and the milk would probably be deficient in quantity or quality. We need not consider it further.

The third class comprises all milch cows that appear to be in perfect health, and would not be suspected by any competent person of being the subject of serious disease, and yet which respond to the tuberculin test, and must, accordingly, be regarded as affected with latent tuberculosis. This is just the class of cow that gives the sharpest reaction—a rise of 5 or even 6 degrees Fahrenheit—and yet when slaughtered all we generally find is a few semi-obsolete patches of the disease in the lungs, bronchial or posterior mediastinal glands. It is, I believe, quite safe to say that at least one-half the milch cows in this country are in this condition, and it therefore becomes extremely important to know whether such animals ever yield infective milk. This is the question which I proposed to answer as the result of the experiments which I undertook last year at the Albert Farm, and for performing which facilities were afforded me by the Department of Agriculture.

Experiments of much the same kind had previously been carried out by many investigators, whose names and references to whose work I append. But most of these workers, at any rate the earlier ones, did not have before their eyes the special object which I had in view—viz., the clear distinction between cows that are recognisably tuberculous in the absence of the tuberculin test, and cows that are not recognisably tuberculous unless the tuberculin test is employed. They mixed up both these classes, and, further, relied, in many cases, for the detection of the bacilli on methods that would not now be regarded as adequate. After careful consideration I decided on the following plan :—Five milch cows, which appeared to be in the best of health, but which had given a positive reaction to tuberculin, were selected from the herd at the Albert Institution, Glasnevin, and their milk injected into guinea-pigs. The exact details of the experiments are as follow :—The udder and hind quarters having been cleansed as usual, the *last* portion of the milk from each quarter of the udder was caused to flow into a sterile litre-flask, the contents of which (about a quart) were then poured off into a funnel, on to the bottom of which was slipped a rubber tube provided with a burette-clip. Funnel and tube were, of course, sterile. The funnels, &c., stood, protected from dust, in a cool room, the temperature of which seldom rose above 60° F. Next day, by means of the burette-clip, the lowest 50 c.c. of the milk, containing all the sediment, was drawn off into glass tubes of special shape, which were then placed in a powerful steam centrifuge and whirled round at the rate of about 2,500 turns per minute, for one hour. A little cream was then found to have accumulated on the surface, whilst the tapered bottom of the tube contained all the sediment. By means of a pipette a little cream was taken off the top of each glass and put in a small sterile beaker. The rest of the milk in each glass was then poured away,

save the last few drops, which were thoroughly stirred up together with the sediment and pipetted off into another sterile beaker. The amount of sediment was made to equal approximately 1 c.c. (about twenty-two ordinary sized drops), and this was then injected beneath the skin of the thigh of a guinea-pig. The cream, to the amount of about 1 c.c., was then injected into the animal's opposite thigh, the syringe having been meanwhile thoroughly rinsed out with boiling water. The guinea-pigs were carefully labelled with the number of the cow, and the date, and put away in their cage. I only lost two animals prematurely from sepsis, and they were inoculated with milk that had been allowed to stand two days when the weather was warm, the temperature of the store-room over 60°, and the milk had begun to undergo fermentation. It was fear of sepsis that caused me to adopt the subcutaneous in preference to the intra-peritoneal mode of infection. My reasons for having recourse at once to animal experiment instead of seeking for the bacilli with the microscope will be apparent to those who have specially concerned themselves with this problem; but it is as well to mention them for the sake of others. In the first place, the microscopic search takes a great deal of time and labour to carry it out conscientiously, and is very severe on the eyes. Secondly, even when bacilli that seem identical in size, shape, and staining-reaction with the tubercle bacillus are found, it is not certain that they are genuine tubercle bacilli, as other organisms occur in the manure of cows, on their skins, on grass, &c., which exactly resemble the genuine tubercle bacillus, and can only be distinguished from it by their cultural characters and the sort of disease they set up in animals. The animal selected for experiment was the guinea-pig, because it is rarely found naturally affected with tuberculosis, and yet is exceedingly prone to take the disease from the injection of even a very small number of bacilli.

The total number of experiments so performed was not large. The milk of four of the cows was tested on five occasions, at intervals of about a week. The fifth cow (No. 117) was marked for slaughter when I had only performed three tests with her milk. The total number of animals inoculated was thus twenty-three, and *not one of them developed tuberculosis.* In addition to these experiments I performed seven others with the *mixed* milk of the dairy herd at the Albert Farm, removing about a quart, treating it as above, and injecting the sediment. I lost one of the animals from marasmus, following a septic abscess at the seat of inoculation; but the other six remained healthy, and on being killed were found free from tubercle. The herd in question, about thirty in number, contained several other cows, at least ten, that reacted to tuberculin.

Finally, with a view to test whether the method I was using would really detect very small numbers of tubercle bacilli in milk, I performed two experiments with milk, to which had been added, not a pure culture of the bacillus, as was done by Adami and Martin, for this could only have produced the one result, but small fragments of "caseous" matter, containing extremely few bacilli. In one experiment the material was derived from a tubercular lymphatic gland, excised at the Mater Hospital, from the neck of a scrofulous child. The matter was typically caseous, but I failed to find tubercle bacilli in it by microscopic examination. The other experiment was performed with some purulent matter derived from an abscess in the lung of cow No. 117. This cow's milk had been three times tested, when it was marked for slaughter. I was present when it was killed, and examined the carcase. The lungs contained about half-a-dozen cheesy knots, about as big as a walnut, scattered through them. The bronchial and mediastinal glands were also affected, but there was no tuberculosis elsewhere. The udder was quite normal. One

of the cheesy masses had softened down into an abscess, which must have contained very few tubercle bacilli, for I did not succeed in finding a single one in a large film-preparation. A little of the caseous matter from each of these sources was rubbed up in sterile milk and injected into a guinea-pig, with the result that the animals so treated were found, a fortnight afterwards, to have cheesy abscesses at the seat of inoculation, and when killed, after another fortnight, were found to have typical tuberculosis of the inguinal and retro-peritoneal glands, as well as at the seat of inoculation. The outcome of these two experiments is that matter containing so few tubercle bacilli that an ordinary microscopic examination failed to detect them, could readily be proved to be tuberculous by the mode of experimentation I was using, and that, accordingly, had the milk that was tested contained even minimal numbers of the specific bacilli, they could hardly have escaped detection. None having been, as a matter of fact, detected, the inference is that none were there, and that the milk was, therefore, non-infective. I may add that I had the opportunity of examining the four cows *post mortem*, and found that the tuberculosis was of slight extent, and that in no case was any abnormality found in the udder.

It may be objected that the total number of animals experimented on was too small, and the trials too few, to enable a definite conclusion to be drawn. Were mine the only experiments on the subject the objection would undoubtedly hold good. Late in the autumn of last year (1901) when I was contemplating a resumption of the work, there appeared in the *Zeitschrift fur Hygiene* (Vol. 38, p. 415) a paper by Ostertag, of Berlin, which, for completeness and accuracy, leaves nothing to be desired, and which may be said to have finally settled the question.

I propose to conclude by briefly setting forth the results achieved by Professor Ostertag—results which, I may say at

once, afford a complete and most satisfactory confirmation of those obtained from the work done at the Albert Farm, and a refutation of the position taken up at the London Tuberculosis Congress of last July by Rabinowitsch and other authorities who held the contrary view—viz., that purely reactional tuberculosis involves infectivity of the milk.

The Prussian Ministry of Agriculture placed at Ostertag's disposal a number of cows of the kind stated. Ten of these he selected as suitable, and used their milk for injection, and for feeding experiments. The sediment, obtained by prolonged centrifuging, was injected into the peritoneal cavity of guinea-pigs. In one set of experiments the milk used was that first drawn off; in another set, that which came last from the udder. The centrifuge used was, in one set of experiments, a hand instrument, giving less than 2,000 revolutions per minute; in another set an electric centrifuge giving 4,000 turns per minute was used. The milk of each cow was tested three times at intervals of four weeks. Sixteen guinea-pigs were used for each test. Some were inoculated but once, others received three consecutive inoculations of the milk of the same cow, with an interval of four weeks between each injection. Altogether between 400 and 500 inoculation experiments were performed, and in *not one* of these was a positive result obtained. A most important circumstance must now be mentioned. The practice at Professor Ostertag's institution was that each cow, before being milked, had its udder washed with 3 per cent. lysol solution, followed by 50 per cent. alcohol, and dried off with sterile cotton wool.

"On the 8th May four guinea-pigs were inoculated with the milk of Cow 10. At the milking of this cow the usual precautions, taken in order to obtain a clean sample, were purposely omitted. *These four guinea-pigs became tubercular.* On the same day four other guinea-pigs were inoculated with milk which was drawn off clean, the usual precautions being

observed. *Not one of these became tubercular.* The neglect of the usual precautions in the obtaining of the first-mentioned sample means that the udder not having been cleaned beforehand, some of the dung adhering to it was allowed to fall into the milk." By a subsequent experiment the dung of this cow was proved to contain tubercle bacilli.

It is well known to all who have worked on this subject that injections, especially intra-peritoneal ones, will produce tuberculosis, when the same material taken as food into the alimentary canal will fail to do any harm. In order to bring the experimental conditions into closer harmony with those which prevail in actual practice, Ostertag carried out with the remainder of the milk of his cows an elaborate series of feeding experiments, on guinea-pigs, calves, and swine. Guinea-pigs are readily infected in this way—a single dose of about an ounce of milk from a cow with a tuberculous udder having proved sufficient for the purpose. Three guinea-pigs received daily for five months 200 grams (about 7 ounces) between them of the new milk from each of the experimental cows. *At the end of this period each had taken about thirty-three times its own body-weight of the milk. Yet not one of them became tuberculous.*

With calves the result was the same. Ten calves were fed on the milk of cows that reacted to tuberculin, but showed no clinical evidence of tuberculosis. They received this milk in quantities of from 7 to 12 litres (a litre = $1\frac{3}{4}$ pints) per day for from eight to eleven weeks. *Not one of them became tuberculous.*

Twenty young pigs were given, each day for four months, as much milk as they could drink from cows of this class. They throve extremely well, and when slaughtered, at the end of the experimental period, *not one was found to be tuberculous.*

Coming now to the practical application of the knowledge just gained we have, first of all, the important fact that,

whatever may be said by alarmists to the contrary, the milk of the cows in Class III., comprising the vast majority of all tuberculous cows, is innocuous to man and beast. But the cows in Class I., which admittedly yield intensely infected milk, and those in Class II., the milk of which, through contamination by excretions and the like, may become, at any moment, infective, must, at an earlier period, have belonged to Class III. Their tuberculosis must have run a latent course for a variable period before it became clinically apparent. Accordingly, the danger we run in continuing to use the milk of such cows ourselves, and in feeding it to our domesticated animals is, that unless we keep up a constant vigilant inspection any one member of Class III. may pass on unobserved into Class II. or Class I.—it may become clinically tuberculous, or its udder may become the seat of infection, and then its milk may become all at once highly dangerous, and, when mixed with that from the other cows, may infect the whole bulk of the milk. The larger the number of cows in a given establishment, or supplying milk to a given creamery, the greater the danger, because the greater the probability that there are amongst the number some cows that have passed into Classes I. or II. That this is actually the case was shown by Rabinowitsch, who tested fifteen samples of butter, from fourteen different butter-shops in Berlin, for tubercle bacilli, and detected them in two samples only, both of which came from one and the same source, a very large creamery. Repeated tests showed that this creamery was regularly supplying tubercle bacilli in its butter. As Ostertag (*loc. cit.* p. 455) justly remarks, the very fact that the bacilli are found in so few samples of butter proves that the cows of Class III. do not yield tubercle bacilli in their milk. If they did, no difference would be found as regards tubercle bacilli between the milk of large and of small establishments; both would contain the bacilli, since the stock in both comprises cows belonging to

Class III. Since such a marked difference obtains it must be due to some other cause, and that other cause is the presence in large batches of stock of individual cows that have passed on into Classes I. and II.

Another circumstance that favours the same conclusion is the dissemination of swine-tuberculosis in Germany. Pigs fed by small farmers with the milk of their own cows are only tuberculous to the extent of ½ per cent., whilst as many as 60 or 70 per cent. of pigs fed on the unsterilised skim milk from large creameries become attacked.[a] It would be most interesting to compare the figures from Ireland if we had them; but I am not aware that any such statistics are available.

Finally, what is the definite practical conclusion to which these considerations lead up? There are only two proper courses open. One is to devise and put in force a systematic inspection of dairy cattle throughout the whole country, and confiscate (with due compensation) the cows that belong to Classes I. and II. Inasmuch as these classes are being continually recruited from Class III., the inspection would also have to be continuous—that is, carried out at short intervals—for an indefinite period. The other course, which appears to me far preferable, is the system of rooting out the disease on the lines suggested by Professor Bang, of Copenhagen, which may be summarised as follows:—

(1.) General application of the tuberculin test.

(2.) Separation of reacting from non-reacting animals.

(3.) Disinfection of the byres and stalls.

(4.) Feeding the calves on boiled milk from the second day onwards.

[a] With regard to the effect of feeding with Centrifuge-slime in producing tuberculosis in pigs, see Ostertag "*Centrifugen-schlamm und die Schweine-tuberkulose*" (Zeitschr. f. Fleisch u. Milch-hygiene, 1893, Heft 1). Also same journal for 1896, Bd. 2, p. 82.

(5.) Inoculation with tuberculin three or four weeks after birth.

(6.) Repeated application of the test to the heifer before she is first brought to the bull.

LITERATURE WITH REFERENCE TO THE INFECTIVITY OF THE MILK OF TUBERCULOUS COWS.

1. ADAMI and MARTIN—Report on Observations made upon the Cattle at the Experimental Station at Utremont P.Q., recognised to be Tuberculous by the Tuberculin Test. (Ottawa Government Printing Bureau, 1899.)
2. BANG (of Copenhagen)—Ueber die Eutertuberculose der Milchkühe und über tuberkulöse Milch. (Deutsche Zeitschr. f. Thiermed. u. vergl. Path., 1884.)
3. „ —Tuberkelbacillen in der Milch tuberkulöser Kühe (First Tuberculosis Congress in Paris, July, 1888).
4. „ —Experimentelle Untersuchung über tuberkölöse Milch. (Ztschr. f. Thiermed, 1891.)
5. „ —Le danger supposé de la consommation de la viande et du lait, sains en apparence, mais provenant d'animaux atteints de la tuberculose. (Congress of Hygiene and Demography, London, 1891.)
6. DELEPINE (Manchester)—On Tuberculosis and the Milk-supply, with some general remarks on the dangers of bad Milk. (Lancet, 1898, Vol. II., p. 733.)
7. „ —The Examination of Cows' Milk. (The Journal of Comparative Pathology and Therapeutics, 1897, p. 192.)
8. ERNST—How far may a Cow be Tuberculous before her milk becomes dangerous as an article of food? (The Amer. Jour. of the Med. Sci., Nov., 1889.)
9. FENNER—Inverkehrbringen der Milch von tuberkulösen und tuberkulöseverdächtigen Kühen. (Berliner thierärztl. Wochenschr. 1898, p. 471.)
10. FIORENTINI—Sulla possibile trasmissione della tuberculose mediante il latte delle giovenche, &c. (Giornale della R. Soc. d'igiene, 1892, p. 198.)
11. FISHER—Archiv. f. Exp. Path. u Pharmak., Bd. XX., 1886.
12. GALTIER—Dangers de l'utilisation des produits tels que le petitlait et le fromage obtenus avec le lait des vaches tuberculeuses. (Comptes rendus, t. CV., 1887, p. 1333.)
13. HIRSCHBERGER—Experimentelle Beiträge zur Infectiosität der Milch tuberkulöser Thiere. (Deutsches Arch. f. klin. Med., 1889, Bd. 44.)
14. JAEGER—Ueber die Möglichkeit der tuberkulöser Infection der Milch und Milchprodukte. (Hyg. Rundschau, 1899.)

15. Knuth—Ein Beitrag zur Feststellung der Eutertuberkulose, und der Frage der Virulenz der Milch der tuberkülosen Kühe. (Ztschr. f. Fleisch-u. Milchhygiene, 1900.)
16. Kuhnau—Gefahr, Erkennung, und Bekämpfung der Eutertuberkulose. (Berliner thierärztl. Wochensch., 1900.)
17. „ —(Several other papers in the Milchzeitung for 1900, dealing with the same subject and with the effect on pigs of Creamery Refuse.)
18. May—Ueber die Infectiosität der Milch perlsüchtiger Kühe. (Archiv. f. Hyg., 1883.)
19. M'Fadyean—Tubercle Bacilli in Cows' Milk as a possible source of Tuberculous Disease in Man. (London Tuberculosis Congress, July, 1901.)
20. Nocard—Mammite tuberculeuse. (Recueil de Méd. Vét., 1896, also a paper at the London Tuberculosis Congress, 1901.)
21. Ostertag (of Berlin)—Ueber die Virulenz der Milch von Kühen welche lediglich auf Tuberkulin reagiren, klinische Erscheinungen der Tuberkulose aber noch nicht zeigen. (Zeitsch. f. Fleisch-u. Milchhyg., 1899.)
22. „ —Untersuchungen über den Tuberkelbacillengehalt der Milch von Kühen, &c. (Zeitschr. f. Hyg. u. Infectionskr., 1901, p. 415.)
23. Ott—Ein weiterer Beitrag zur Milchhygiene. (Ztsch. f. Fleisch-u. Milchhyg., 1898.)
24. Peuch—Note sur la contagion de la tuberculose dans le lait non bouilli et la viande crue. Nouvelles expériences sur le porc et le lapin. (Révue Vétérinaire, 1888.)
25. Rabinowitsch and Kempner—Beiträge zur Frage der Infectiosität der Milch tuberculöser Kühe, sowie über den Nutzen der Tuberkulinimpfung. (Zt. f. Hyg., 1899.)
26. „ —Bemerkungen, &c. (Cb. f. Bakt. u. Parasitenk, 1899, p. 288.)
27. „ —The Infectiousness of the Milk of Tuberculous Cows, the bacteriological diagnosis, and the practical value of Tuberculin for the extermination of Tuberculosis among Cattle. (London Tuberculosis Congress, 1901.) (The full paper appears in the Zeitschrift für Hygiene, 1901, p. 439.)
28. „ —Ueber die gefahr der Uebertragung der Tuberkulose durch Milch und Milchprodukte. (Deutsche Med. Woch., 1900.)
29. Ravenel—Tuberculosis and Milk-supply. (Reports and Papers of the American Public Health Association, 1898.)
30. Schmidt-Muhlheim—Ueber den Nachweis und das Verhalten der Tuberkelbacillen in der Kuhmilch. (Arch. f. anim. Nahrungsmittelkunde, Jahrg. V.)
31. „ —Ueber die Gefahren der tuberkulösen Milch und die Tenacität, &c. (*Ibid.*)

32. SMITH and SCHROEDER—Some experimental observations on the presence of tubercle bacilli in the Milk of Tuberculous Cows when the udder is not visibly diseased. (U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin 3, 1893.)

33. SCHROEDER—Further experimental observations on the presence of tubercle bacilli in the Milk of Cows. (*Ibid.*, Bulletin 7, 1894.)

34. STEIN—Experimentelle Beiträge zur Infection durch Milch perlsüchiger Kühe. (Inaug. Diss., Berlin, 1884.)

DR. FALKINER would venture to ask Professor McWeeney in reference to the third class of milch cows which react to the tuberculin test, and are found to be suffering from some form of latent tuberculosis, if there was not the danger of the rupture of a tuberculous abscess in these animals which would produce a general tuberculosis likely to infect the milk, and suggested that frequent examinations of the animals in this class should be made by experts.

PROFESSOR MCWEENEY said that theoretically the view of Dr. Falkiner was correct, and that the cows should undoubtedly be inspected at short intervals. The testing of milk for the bacillus of tubercle could only be carried out by an expert bacteriologist.

INSPECTION OF DAIRY HERDS.

By SIR CHARLES A. CAMERON, C.B., M.D.;
Professor of Chemistry, Royal College of Surgeons;
Superintendent Medical Officer of Health, City and County Analyst, Dublin.

[Read in the Section of State Medicine, April 25, 1902.]

THE Pasteurisation and sterilisation of milk are processes which are now carried out in many places on a pretty large scale, especially Pasteurisation. Bacteriologists are not unanimous as to the effects of Pasteurisation on microbial life, some being of opinion that it does not ensure the destruction of all dangerous micro-organisms, and especially of their spores. Sterilising is a much more certain process for the destruction of microbes; but the process usually impairs the flavour of the milk, though the inventor of Kühn's steriliser claims that in his machine the milk retains its flavour.

However desirable it may be to subject milk to either of the above processes, other means of preserving this largely used fluid from contamination should not be neglected Some of the provisions of the Contagious Diseases (Animals) Act and the Orders in Council relating thereto, and sections of the Public Health Acts, refer to milk-shops and dairy herds. They confer considerable powers in reference to the hygiene of these places and animals upon the local sanitary authorities. The bye-laws referring to cow-sheds and milk-shops in force in some towns are excellent, and are enforced; but in other towns there is a lax inspection of the places that cows are kept in and milk vended. It is, however, in the rural districts that inspection is least attended to; indeed it may be safely said that the majority of dairy yards and sheds in the United Kingdom are under no supervision whatever.

It is admitted that two diseases are not infrequently spread

through the medium of infected milk—namely, typhoid fever and tuberculosis. As regards the former disease, the cow itself is innocent, for the infection of the milk takes place after the cow has yielded it. The medical officer of health deals with the cases in which infected milk is suspected to be the carrier of the *Bacillus typhosus,* In the case of tuberculosis, it is, with few exceptions, the cow which infects the milk, and consequently the inspection of the cow is the province of the veterinary surgeon. For this and other reasons I am of opinion that on the sanitary staff of every local authority there should be a veterinary surgeon. In the case of larger towns his whole time should be at the disposal of the authority, and in the smaller towns or rural districts a sufficient portion of his time should be secured. In Dublin a veterinary surgeon is a whole time officer, exclusively for sanitary purposes, for he does not act as a practitioner in the case of the horses of his own authority.

The Contagious Diseases (Animals) Acts have been of the greatest use in Ireland and no doubt in all the rest of the United Kingdom. The contagious pleuro-pneumonia of the ox, which existed continually for nearly 60 years, decimating frequently the dairy herds, especially those of the towns, is no longer in existence in Ireland. This extirpation of the disease is admittedly the result of the working of these invaluable Acts. Until lately the supreme authority in the administration of these Acts was in Ireland the Privy Council, but the recently established Department of Agriculture and Technical Education has taken over the veterinary department of the Privy Council. The veterinary inspectors under the Contagious Diseases (Animals) Acts are, with few exceptions, appointed by the local sanitary authorities, but one moiety of their salaries is paid by the Department of Agriculture. The diseases which the Acts deal with do not include tuberculosis, consequently with one exception the

veterinary inspector takes no notice of tuberculosis. The exception is the Dublin veterinary inspector, who acts under the Public Health Act as well as under the Contagious Diseases (Animals) Act.

I am strongly of opinion that it would be desirable the whole inspectorial work under the provisions of the Contagious Diseases (Animals) Acts, and of dairies and cow-sheds under the provisions of the Public Health Acts, should be directly under the Department of Agriculture. The veterinary inspectors, aided by the city police and Royal Irish Constabulary, and assisted by the local sanitary authorities, could strictly enforce sanitary conditions in the cow-sheds both in country and town. The cows should be systematically examined in order to determine whether or not they were affected by tuberculosis. The names and addresses of all the persons connected with milk-shops, creameries, and dairy-yards should be ascertained, and it would be the duty of the medical officers of health and sanitary inspectors to ascertain whether or not any of those persons were affected by contagious disease or resided in houses in which such disease existed.

The Irish Board of Agriculture have a staff of veterinary surgeons numbering about 50. The Board contributes one-half of the salaries of the veterinary surgeons, who act under the county and town councils. The Board's staff are whole time men; but the local authorities' veterinarians are all practitioners, with the exception of Mr. Watson, who acts for the City of Dublin. The work under the provisions of the Contagious Diseases (Animals) Acts is divided between these two classes of inspectors. The whole time men act as port inspectors, and they deal exclusively with swine distemper. I am strongly of opinion that the two classes of inspectors should be wholly under the Board of Agriculture, and that tuberculosis in the cow should be made a notifiable disease.

I do not propose to discuss the vexed question should compensation be given to the owners of tuberculous cows, the carcases of which are confiscated, but I am sure compensation would lead to more frequent notification. The chief point would be to get a systematic inspection of the dairy cows by the veterinarians of the Board, assisted to some extent by the constabulary. As practically there is no inspection of the kind in the rural districts in Ireland, it would be a great gain to public hygiene if the health of our dairy stock were carefully inquired into and proper means taken to enforce cleanliness and ventilation in the cow-sheds. It is no exaggeration to say that the conditions under which cows are kept, especially in rural districts, are unfavourable to the health of the animals and the purity of the milk.

As regards the English Board of Agriculture, their work in reference to the Contagious Diseases (Animals) Act is almost entirely carried on by the officers of the Local Authorities, as only three veterinary surgeons are directly attached to the Board. If the Board were to undertake the supervision of all the dairies in England and Wales, they would require a very large staff. I am aware that there is a tendency to decentralise sanitary administration, as is shown, for instance, by the gradual transference of many of the duties of His Majesty's inspectors of factories and workshops to the officers of local authorities. I am, however, of opinion that the duty of inspecting the animals of the farm and the dairy yards would best be carried out in both England and Scotland by the Officers of the Boards of Agriculture.

DR. KIRKPATRICK believes that in the direction indicated in the papers there is room for much good work. Hampered by Koch's theory scientists appeared to the public as divided on this sanitary question, and consequently could not hope for lay support. The danger could hardly be over-estimated. MacFadyen estimated

that 70 per cent. of the cattle were tuberculous, statistics verified by examination after the slaughter of the animals. The dairy yards of the city were well adapted for the growth of bacilli. Cattle whose lungs are infected are a constant source of infection to the others. Pure milk exposed, as it often is, in these dirty byres in wide, open vessels, is readily infected by tuberculosis.

Dr. Matson thought that feeding of the cattle is of importance. He has seen in Canada cattle fed in underground cellers fattened on grain for the English market. Animals so deprived of natural food and fresh air cannot be healthy, and such cows cough and vomit matter which is almost certain to convey tubercle. The precaution of boiling all milk before use should be adopted.

Sir Charles Cameron wished to remind the Section that the recent Viceregal Sanitary Commission declared that the cows in the city dairy yards were much better fed than those in the rural districts. They stated that the Dublin dairy yards were incomparably superior to those in the urban districts; the hygienic arrangements were better, and the milkers and other attendants much cleaner. The Dublin cows are sent to grass for seven months of the year; their milk contains 14 per cent. of solids as against 12 per cent. in the country. A veterinary surgeon examines their udders regularly during the winter season, and the personal cleanliness of the attendants is ensured by a by-law which makes dirty hands punishable by a fine, and during the last year forty milkers were fined for having their hands dirty.

Professor McWeeney believes that a codification of our sanitary laws is a necessity; as it is, a whole library of legal books is wanted to find out the law on sanitation. They (sanitarians) want one big Act which will include everything. Sterilisation of milk is out of the question—it makes ordinary milk unsightly and unpalatable; spores resist boiling for three hours under a pressure of two atmospheres. Pasteurisation kills typhoid germs at a temperature of 140° F., and 190° F. kills the tubercle bacilli; no creamery should be allowed to vend milk until it has been properly Pasteurised. As for the Dublin dairy yards, he considers them a disgrace to civilisation; they are kept in an intolerably filthy state, and, as for the attendants, he thinks if they had the German sanitary law in force here some 90 per cent. of the milkers would be arrested, and be forcibly washed. The condition of the cows with their flanks caked with fæces and their unwashed udders in

city byres, where the fresh milk is allowed to remain in open shallow vessels in which not infrequently fæcal matter floats, is abominable. In Germany the fæcal matter would be washed off the cow, and the milk would not be allowed to remain in the byres to be infected. Cows cough and sneeze and usually swallow some of the sputum, passing the tubercle in the fæces, and of course infecting healthy animals and contaminating the milk. There can be no proper supervision of dairies without a bacteriologist; a veterinarian cannot make an exhaustive microscopic examination of milk or perform the necessary biological experiments; this is the work of a biologist, and can be done by a biologist only.

Congenital Malformation of the Hands.—No. I.

Congenital Malformation of the Hands.—No. II.

SECTION OF ANATOMY AND PHYSIOLOGY.

CONGENITAL MALFORMATION OF THE HANDS.

By S. W. ALLWORTHY, M.A., M.D., F.C.S.;
Physician, Belfast Hospital for Skin Diseases.

[Read in the Section of Anatomy and Physiology, January 31, 1902.]

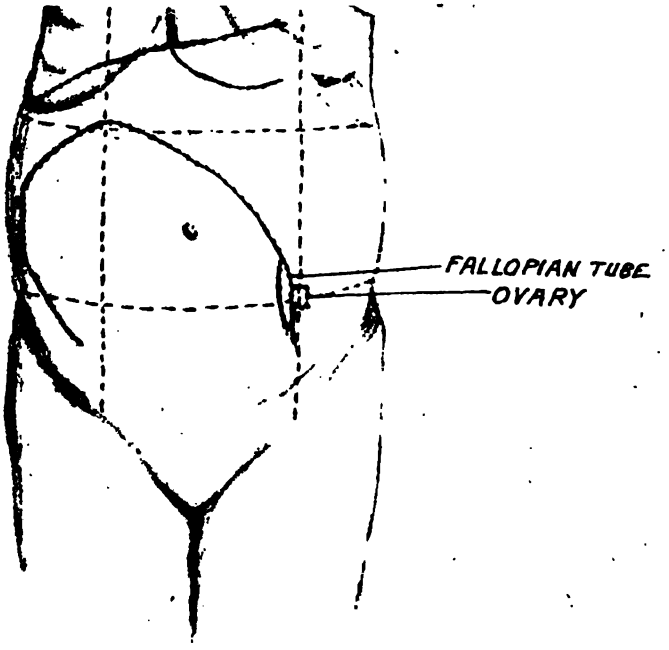
The photographs and radiographs of this case taken by me are interesting as illustrating some peculiarities of development. They are of a man's hands, aged thirty, who was a seven months' twin. In the right hand all the bones of the middle finger are absent, and there is not a trace of them to be seen in the skiagraph. The left hand has all the bones, but the first phalanx of the index finger evidently developed across the palm of the hand (which is well shown in the skiagraph) and its pressure wedged the bones of the second and third fingers into each other, so that they became united. The piece of bone between the second metacarpal and the second phalanx is probably an overgrowth of the base of the first phalanx, due to the displacement during ossification. The hands are wonderfully useful, and there is no other deformity.

There is no history of any similar occurrence in the family, and the only fact of interest related by the mother is, that during the early months of pregnancy she fell across a wall whilst stretching over to feed pigs.

The other twin was smaller, but otherwise perfectly developed.

A second case came under my notice a short time ago in

which both hands had all the bones of the middle finger missing, and presented an appearance identical with the right hand in the above. There was no history of importance, and my patient, who was not a twin, in this instance said his mother always attributed the deformity to the loss of a wedding ring.


FALLOPIAN TUBE
OVARY

ON THE ABDOMINAL AND PE
IN ADVANCED PREGNAN

By F. GILLMAN MOORHEAD
Lecturer on Anatomy, School of Phy
Section of Anatomy and Histo

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NOTES ON THE ABDOMINAL AND PELVIC VISCERA IN ADVANCED PREGNANCY.

By T. GILLMAN MOORHEAD, M.B.;
Demonstrator of Anatomy, School of Physic, Trinity College.

[Read in the Section of Anatomy and Physiology, January 31, 1902.]

Having recently had an opportunity of dissecting the abdominal and pelvic viscera of a female subject who was in the seventh month of gestation, I have thought it might prove of interest to bring before you to-night some of my notes.

I am more particularly led to do this because the subject was hardened by the injection of formalin. Although we have many accounts of the pregnant abdomen as observed in frozen sections and in subjects prepared in the ordinary way, as far as I am aware no account has as yet been published of a case in which the viscera had been hardened *in situ* by formalin. The surface marking of the viscera was first mapped out, and it was found that the uterus extended well above the subcostal plane, and was inclined to the right side. The left ovary came into relation with the anterior abdominal wall immediately above the inter-tubercular plane, and external to the left mid-Poupart plane. Lying just internal to the ovary runs the left Fallopian tube. The surface relation of the liver and stomach was normal.

On opening the abdomen, the uterus was found to be not only inclined to the right, but also markedly rotated on its long axis, thus bringing the left ovary and Fallopian tube into the position I have described, while the right ovary and Fallopian tube lay posteriorly in relation to the cæcum. The upper margin of the uterus was at a point about ten inches above the symphysis pubis, and was overlapped by the trans-

[illegible] Abnormal Pregnancy.

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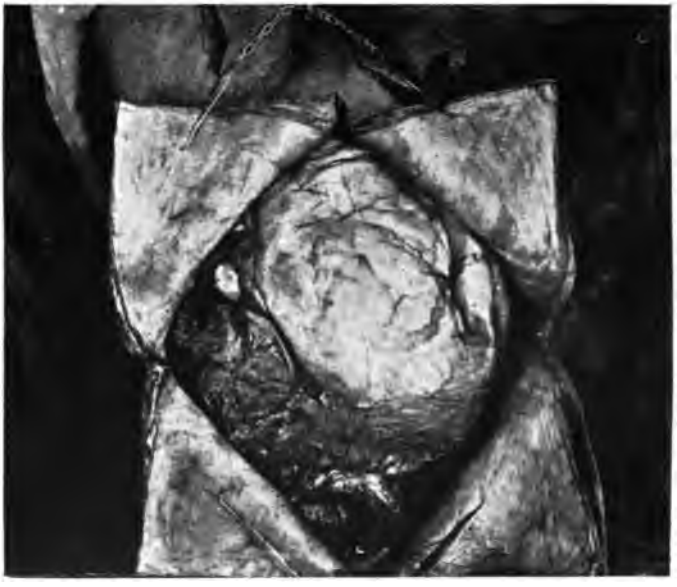
DR. T. G. MOORHEAD ON THE ABDOMINAL AND PELVIC VISCERA IN ADVANCED PREGNANCY.



disc between the third and fourth lumbar vertebra. The cæcum lay completely above the iliac crest and was completely flattened out by the pressure of the uterus.

Passing now to the pelvis, we see that, contrary to what might have been expected, the pelvic diaphragm was not in any way hypertrophied. Some additional support to the uterus, however, appeared to be given by the obliterated hypogastric arteries. From the upper and lower margin of these fibrous cords muscular fibres arose and passed on to the antero-lateral aspect of the uterus. These two supports when viewed as a whole presented the appearance of a hammock.

The bladder lay in relation to the lower portion of the uterus. It was triangular in shape, and contained no urine. The apex was directed upwards and lay behind the symphysis pubis. The base rested on the anterior wall of the vagina immediately in front of the place where the uterus pierced the anterior vaginal wall. The anterior aspect was convex from side to side and from above downwards, and the posterior aspect was concave and moulded upon the uterus. From the lower portion of the anterior aspect the urethra arose and passed downwards and forwards. The intra-abdominal portion of the ureter presented the usual relations. That of the right side was obviously exposed to the pressure of the uterus. Crossing the external iliac artery the ureter proceeded downwards in front of the internal iliac artery, and gradually passed to the inner side of that vessel, when it turned forwards, lying about midway between the pelvic wall and the uterus; it was crossed by the uterine vein and artery, and then turning round the utero-vaginal junction entered the bladder at each base angle. The right ureter entered the bladder at a point a little below and external to the point where the left ureter entered. The measurements were 26 mm. from the middle line on the left side and 30 mm. on the right. The right entrance lay at a point 27 mm. below

a line drawn from the upper margin of the symphysis to the upper margin of the great sciatic notch, and the left entrance 22 mm. below that line. These measurements give precision to the fact that the bladder shared in the obliquity and in the rotation of the uterus.

The vaginal plexus of veins which drains its blood into the internal iliac vein was enormously dilated. It is shown in the accompanying photograph. No enlargement of the bulb or clitoris was noticed.

The only other viscera that deserve notice are the kidneys. The upper margin of the right kidney extended to within half an inch of the last rib, and the lower margin to a point one inch above the iliac crest. It presented an upper facet in relation to the liver, and a lower facet on which the uterus rested. Over both facets the fatty capsule had completely disappeared.

The left kidney extended above to a point half an inch above the last rib, and below to a point an inch and a quarter above the iliac crest. Its relations and fatty capsule were normal.

It is thus seen that the right kidney was slightly displaced downwards. Inspection of the viscera seemed to favour the view that this was due to the anterior portion of the liver being hollowed out by the upward pressure of the uterus, and that its posterior part in consequence exerted an increased downward pressure on the kidney. This displacement downwards, together with the atrophy of the fatty capsule, may account for the greater frequency of movable kidney on this side.

Many of these facts agree with what has been previously recorded, while some few differ. I have purposely refrained from comparing my observations with those of others, as to do so would occupy too much of your time.

THE RELATIVE WEIGHTS OF THE RIGHT AND LEFT SIDES OF THE BODY IN THE FŒTUS.

By T. G. MOORHEAD, M.B., B.Ch., Dub.;
Chief Demonstrator of Anatomy, Trinity College, Dublin.

[Read in the Section of Anatomy and Physiology, May 30, 1902.]

The object of the following paper on the subject of the relative weights of the thoracic and abdominal viscera, on either side of the mesial plane of the body in the fœtus, is to establish the fact that in the fœtus after the fifth month there is a marked preponderance in weight of the right side over the left, which is to be ascribed to the disposition of the abdominal viscera. Owing to the difficulty in obtaining a sufficient number of specimens the investigation could not be carried out upon fœtuses of an earlier age.

From among the numerous weighings which I have made it will be only necessary to quote the averages, since a detailed account would prove tedious, and, moreover, the differences in weight obtained in each case did not vary in any proportionate manner with the age of the specimen.

Numerous investigators have endeavoured to decide whether there is any difference in weight of the corresponding limbs on the right and left side in the new-born child and in the fœtus, but as yet no definite agreement exists amongst them, although weighings have been made both of the limbs as a whole and of the bones and muscles separately. Hasting[1] states that at birth no difference in length between the upper limbs is present, but that the bones of the right side are the heavier as a result of hereditary transmission. Bischoff,[2] Gaupp,[3] and Theile[4] agree with the latter part of this statement, and indeed in one case Theile found that the right arm

of a new-born child weighed as a whole 4 per cent. more than that of the opposite side. Gaupp, however, qualifies his opinion by stating that the difference does not exceed the limits of possible error, and when his cases and those of Bischoff are examined it is found that out of a total of eleven cases the right arm was the heavier in three, the left in three, and that complete equality existed in six cases. Theile, weighing the muscles separately, found that no difference existed between those of the right and left arm taken as a whole, but that differences existed in the weight of certain groups. Biervliet,[5] on the other hand, found that a difference of as much as 1·85 grammes existed between the total weights of the muscles of the right and left upper limb, the right being the heavier of the two. In the lower limbs a similar difference in results obtained is found. Thus, to quote only one authority, Bischoff[2] out of three cases found the right lower limb the heavier in one, and the left in two.

From this mass of conflicting evidence I am forced to the conclusion that no real difference exists, and that when any has been found it has been due to unavoidable errors in the preparation of the specimens, and my own observations confirm me in this opinion. After weighing as a whole the limbs of eight fœtuses I was unable to detect any constant difference, and even had I found such to exist, I would not be inclined to lay stress upon the fact, since the smallest difference in moisture would readily account for it. A similar remark applies to weighing of the muscles separately, though in one fresh fœtus in which I weighed the muscles of each upper limb as a whole, and also the biceps muscles separately, no difference was found. More importance then should be laid upon a difference in weight of the bones of the two sides; but out of three cases in which weighings were made of these in both the upper and lower limb I could not detect the smallest difference. In a fourth case I even weighed the diaphyses of the humerus,

radius and ulna of one side with those of the other, and also the diaphyses of the femur, tibia and fibula of the two sides, and found an absolute equality in the weights obtained.

As early as 1863 a paper was published upon the subject of the weights of the thoracic and abdominal viscera by the late Professor Struthers,[6] and appeared in the *Edinburgh Medical Journal* for that year. He confined his attention to the examination of adults and of children of from two to three years of age, and though he does not express himself definitely upon the point, appears to have been of the opinion that the large size of the left lobe of the liver in the fœtus caused the viscera on that side to be of an equal weight with those on the left. His object was to prove that the centre of gravity of the body lies to the right side of the mesial plane, even when the limbs have been removed, and the weighings which he has given in proof of the point are, I believe, in the main reliable. However, the methods of hardening the viscera were then very imperfect, and, moreover, many of the organs were only divided and weighed after they had been removed from the body, and had lost their shape. But if the same fact can be shown to hold good for the fœtus in which the viscera have been hardened by formalin and accurate mesial sections made, it will, I believe, be *a fortiori* true in the case of children and adults, and the point, in addition to being of some slight importance from an obstetrical point of view as possibly being a determining factor in the different varieties of vertex presentations, will also be of interest in the general study of animal equipoise.

As would be expected, the weight of the thoracic viscera on either side of the mesial plane varies with the age of the fœtus. During the fifth and sixth months the weight on the two sides does not differ much, but after this the left side steadily gains upon the right till at full term it averages about 56 per cent. of the entire weight of the thoracic viscera, and is heavier than

the right side by about 92 grains. The difference is due in part to the larger size of that portion of the thymus gland, which lies to the left of the mesial plane, but principally to the position of the heart, for the right lung is heavier than the left in even a greater proportion than in the adult. Thus in one fœtus of about six months the right lung weighed 60 grains and the left 47 grains, while the left portion of the heart weighed 23 grains as against 15 grains for the right portion, the total difference on the two sides being only 5 grains, and that in favour of the right side. In another fœtus of eight months the right lung weighed 118 grains and the left 103 grains; the right portion of the heart weighed 30 grains and the left portion 135 grains, the total difference on the two sides being 90 grains in favour of the left side.

It is possible that during life the left side would preponderate still more over the right on account of the chambers of the heart containing more blood, but any such difference must be very slight, since it is a peculiarity of the fœtal heart that after death the left chambers contain nearly as much blood as the right.

In the abdomen in the fœtus the space allotted to viscera on either side of the mesial plane is the same, for if casts be made of the entire visceral mass enucleated *in toto* from the abdominal cavity it is found that after making a mesial section the weight of the two halves is identical, or that in any case there is not a difference of more than 1 per cent. Any difference in weight on the two sides is therefore due to the different grouping of the hollow and the solid viscera, the former being for their bulk light as compared with the latter. After an examination of several fœtuses of from five to eight months it was found that the right side of the abdominal visceral mass represented from 56 per cent. to 53 per cent. of the entire weight of these viscera, and was heavier than the left by from 105 to 300 grains, the excess of weight being due

to the right portion of the liver. It is sometimes stated that during fœtal life the right and left lobes of the liver are of almost equal size, and indeed on opening the abdomen they often appear to be so at first sight; but the antero-posterior depth of the right side, especially towards its lower free margin, is always much greater than that of the left side, and consequently the right portion is much the heavier. Thus in one case the right side was found to be nearly three times as heavy as the left, and at full term it was more than once found to be a little over twice the weight of the left side.

The kidneys and suprarenal capsules of the two sides are almost exactly equal in weight, but the portion of the intestinal tract, together with the spleen, in the left side weighs more than the intestinal tract in the right side. The difference is, however, usually slight as compared with the difference in weight of the two sides of the liver.

Towards full term, indeed, the accumulation of large masses of meconium may cause the total weight of the viscera on the left side to become almost equal with that on the right side; but since this is only a temporary condition it cannot be held to invalidate the general result, which may be stated as follows:—From at least the fifth month of fœtal life onwards the centre of gravity of the body is placed to the right side of the mesial plane, the thoracic and abdominal viscera on this side representing 52·6 per cent. of the total weight of the viscera, as compared with 47·4 per cent. on the left side. The child, therefore, enters upon its extra-uterine existence with a marked right-sided bias.

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[5] VAN BIERVLIET—L'Homme Droit et L'Homme Gauche.

[6] STRUTHERS, G.—"The Relative Weights of the Thoracic and Abdominal Viscera on either Side of the Mesial Plane of the Body." (Edinburgh Medical Journal, 1863.)

DR. CUNNINGHAM said the paper was most valuable, dealing as it did with the centre of gravity, a subject which had not been dealt with since Professor Struthers published his paper in 1863, which was almost directly due to Buchanan's views on the position of the centre of gravity in the human body. Struthers' investigations were on the adult body, and he had not the advantage of the formalin process; he also included the limbs in his calculations. He (Professor Cunningham) was of opinion that the bones of the right upper extremity, and to a slight extent the muscles also, were weightier on the right side.

PROFESSOR BIRMINGHAM said the paper was very interesting, though it had little bearing on the curious question of right-handedness, which he looked on as due more to the influence of the muscles of the forearm than to the location of the centre of gravity.

THE FORM AND POSITION OF THE THORACIC AND ABDOMINAL VISCERA OF THE RUFFED LEMUR (*LEMUR VARIUS*).

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INTRODUCTION.

The present communication constitutes Part II. of a paper which I read before the Section of Anatomy and Physiology on a former occasion.[a] In this part the abdominal and pelvic organs of *Lemur varius* are described. Since the paper dealing with the thoracic viscera was published I have had the opportunity of dissecting a male specimen of *Lemur flavifrons*, a species which closely resembles *Lemur varius*. Several catarrhine apes, and other animals, have also been examined for the purpose of comparison. All specimens were thoroughly hardened with injections of formalin, and, as in the case of *Lemur varius*, particular attention was paid to profile dissections and to such as displayed the vertebral column and its relations to the level of the abdominal organs. In most cases the dimensions were worked out, but the results can hardly be said to express the proper average sizes of the viscera, seeing that only three Lemurs (including two species) were dissected.

[a] *Vide* Transactions of the Royal Academy of Medicine in Ireland. 1899. P. 562.

PART II.

ABDOMINAL VISCERA.

General Position.[a]—When the abdominal cavity is opened from the ventral aspect, and the organs examined *in situ*, it is manifest that they occupy a somewhat different position from those in Man and some of the Anthropoid apes. Thus, in the Lemur the greater part of the liver, which comes into contact with the posterior aspect of the anterior abdominal wall, consists of the left lobe. This is mainly situated in the middle line, below the xiphy-sternum, and between the tenth pair of costal cartilages. But the lower part of this lobe of the liver descends from under shelter of the costal arches, covering some of the anterior surface of the stomach (fundus, lesser curvature, and part of pylorus). A small, wedge-shaped part of the cystic lobe, where it appears below the tenth right costal cartilage, is also related to the posterior aspect of the anterior abdominal wall. The right lobe, being placed relatively far back, lies under shelter of the lower costal arches, the diaphragm and pleura intervening. This part of the liver is best seen in a dissection made from the right side (*vide* Plate IV. (B.) L.). In the Anthropoids which I dissected—viz.,*Troglodytes niger*, *Satyrus orang*, and *Hylobates hainanus*—both the right and left lobes of the liver come into contact with the posterior aspect of the anterior abdominal wall in the epigastric region. In these animals the cystic has blended with the right and left lobes.

In *Lemur varius* almost the whole anterior surface of the moderately distended stomach (below the liver) is directly related to the ventral wall of the abdomen; in man only a very limited portion, as it presents in the epigastric region. *The stomach of the Lemur reaches to a lower level in the abdominal cavity than that of Man.* In the former

[a] The animal is supposed to be in the erect posture as the abdominal organs are described in the text.

most of the anterior surface of the stomach lies below the sub-costal plane, extending to a point midway between the ensiform cartilage and the symphysis. In Man, on the other hand, by far the greater part of the anterior surface of the stomach lies under shelter of the lower costal cartilages and ribs of the left side; and, when even moderately distended, this viscus seldom crosses below the sub-costal plane. When the great omentum is removed several coils of intestine are seen lying below the stomach. These belong to the jejunum and ileum, the transverse colon being hidden from view by the stomach, which lies anterior to it. The bladder projects above the symphysis pubis, resembling in form and position the same organ of the human fœtus (*vide* Plate V. (A.), (B.)).

Position of the Viscera as seen from the Dorsal aspect.—Before disturbing the posterior abdominal organs, the position which they occupy in the abdominal cavity may be noted at this stage of the dissection. Further on the relations of each will be described.

The kidneys do not occupy the same level. The right is the higher of the two,[a] and its upper third is covered by the right pleura and diaphragm. The summit of the left kidney reaches to the lower end of the diaphragm, at the level of the upper border of the second lumbar vertebra. It is interesting to note that the difference in level of the two kidneys is the reverse of the condition found in Man; in the latter the right kidney usually occupies a slightly lower level. In the Hainan Gibbon (*Hylobates hainanus*) I found that the two kidneys occupied the same level. In the Lemur the spleen is related to the outer side of the left kidney. The former viscus extends upwards, beyond the kidney, under shelter of the pleura and diaphragm. Only a partial view of the spleen can be obtained from the

[a] In *Lemur flavifrons* the difference in level seemed more marked. The right kidney is higher than the left by more than its whole length.

dorsal aspect before the pleura and diaphragm are removed. Below the kidneys two coils of intestine, an outer and an inner, are situated. On the left side they run almost vertical and parallel with each other. The outer is part of the ileum; the inner the descending colon. The left ureter descends on the dorsal aspect of the latter. The two coils of intestine below the right kidney take a more tortuous course. The upper and inner one is the duodenum; the lower and outer the attenuated or 'vermiform' portion of the elongated cæcum. The right ureter descends on the dorsal aspect of both these portions of intestine (*vide* Plate V. (B.), (U.).

THE PERITONEUM.

The manner in which this serous sac is related to the abdominal parietes, and is reflected over the viscera, differs only in minor details from the peritoneum of the human subject.

(A.) *Parietal Peritoneum.*—It descends low down into the pelvis, clothing the rectum as far as the prostate, to which latter it gives a partial covering. It then ascends on the posterior wall of the bladder, the seminal vesicles receiving an investment. In the female the parietal peritoneum is reflected from the rectum to the posterior vaginal wall, clothing its upper half. From this the peritoneum is carried over the uterus, the anterior and posterior surfaces of which it almost entirely covers. The line of reflection from the uterus reaches to the upper aspect of the neck of the bladder behind. Laterally the peritoneum leaves the bladder, and is reflected on to the pelvic wall at a slightly higher level; the bladder therefore is largely invested by peritoneum.

(B.) *Visceral Peritoneum*:—

1. The duodenum possesses a mesentery along its whole length, between the folds of which the pancreas sends a few of its processes.

2. The large intestine, from the cæcum to the lower part

of the rectum, is connected with the posterior wall of the abdomen by a mesentery.

3. The epiplöon (great omentum) is an extensive fold reaching to the symphysis. In the Lemurs which I dissected its four layers could be separated. They were exceedingly thin and transparent, with numerous masses of fat lobules between them.

4. The gastro-hepatic omentum is long; narrow below, but widens out as it approaches the transverse fissure of the liver. Its length measures 6 cm.

THE STOMACH.

The fundus of the stomach, when moderately distended, is rather ovoid in shape, its long axis being almost vertical.[a] The pylorus is of considerable length, and is bent sharply on the fundus, proceeding in an upward direction towards the liver. The major axis of the pylorus is also nearly vertical. In this way the lesser curvature is reduced in width; indeed below the liver it is extremely narrow. This curvature is somewhat sickle-shaped. The pyloric and cardiac openings somewhat approach each other, the latter being some distance below the summit of the fundus. The anterior wall of the stomach is thickened by a band of fibrous tissue which extends from the cardiac to the pyloric opening (F.T., Plate I.). As already mentioned, the stomach of *Lemur varius* is comparatively large, most of it belonging to the fundus. The greater curvature extends downwards in front of the transverse colon and the terminal stage of the duodenum; *in Man it is situated above these parts of the alimentary tract.*

The greater curvature may be divided into three stages, according to the different directions which it pursues. The

[a] Compared with the stomach of *Chiromys* it appears to be more elongated. *Vide* monograph on the *Aye-aye* (Owen. Trans. Zool. Soc. 1866).

first is short, and extends upwards, with a slight inclination to the right, from the cardiac orifice to the fundus. It measures 2·5 cm. The second descends almost vertically and is 10 cm. long. The third is directed horizontally to the right for a short part of its course; it then ascends, almost parallel to the second stage, as far as the pyloric opening. This part of the greater curvature measures 7 cm. The omenta attached to the curvatures of the stomach have been described (see Peritoneum).

Relations.—The viscera forming the "bed" on which the stomach rests are more in number than those found in the human subject and some of the higher apes. Thus, in addition to the inner surface of the spleen, the front of the left kidney, with its adrenal capsule, the pancreas and the meso-colon, the stomach of *Lemur varius* is related posteriorly to the duodenum, hepatic flexure, transverse colon, and a small part of the right kidney.

Anterior Relations.—These have been mentioned already in a great measure when describing the position of the stomach *in situ*. It has been shown that the lesser curvature and upper part of the fundus[a] lie under shelter of the left and cystic lobes of the liver. The remaining part of the front wall of the stomach comes into direct contact with the posterior aspect of the anterior abdominal wall. This is an extensive gastric area, measuring 5·5 cm. vertically, and 6·5 cm. transversely. Lastly, a very small part of the extreme left of the summit of the fundus is related to the cupola of the diaphragm, immediately above the upper end of the spleen, where the latter is crossed by the twelfth rib. As the pylorus ascends towards the under surface of the liver it is lodged in a definite and elongated *hepatic recess*, bounded in front by the lower parts of the cystic and left lobes,

[a] This part of the stomach, when distended, leaves a deep concave impression on the under surface of the left lobe of the liver.

and behind by the right lobe. At the summit of this recess is the gall-bladder; here the pylorus terminates by bending backwards and downwards to form the commencement of the duodenum, which, in the upper part of its first or vertical stage, passes downwards in the same hepatic recess running parallel to the pylorus (*vide* Plate IV., B.).

Topography of the Gastric Orifices :—

Cardiac—Opposite the lower border of the 12th dorsal vertebra.

Pyloric—Opposite the lower border of 1st lumbar vertebra.

N.B.—These openings are close to each other, there being only 3·5 cm. between them.

Dimensions.

Length of fundus - - -	11·5 cm.
Breadth of ,, - - -	9·5 cm.
Length of pylorus - - -	4·5 cm.

THE SMALL INTESTINE.

In the *Lemurines* this part of the digestive canal varies in length. In many species it is about three times as long as the body. In *Galeopithecus* it may measure four times the body length. In a male of this genus, according to Owen,[a] the small intestine was four feet four inches, the body, from the apex of the nose to the root of the tail, measuring one foot four inches. In *Lemur varius*, I found that the small intestine measured twenty-four inches,[b] the total length of the animal, omitting the tail and limbs, being sixteen inches. Most of the coils occupy the cavity of the abdomen proper, the pelvic basin being too small to accommodate more than a few inches of the ileum. Throughout the greater part of its extent the small intestine possesses a wide calibre, especially at its com-

[a] Anatomy of Vertebrates. Vol. 3, p. 430.

[b] The small intestine of *L. flavifrons* measured 27 inches, the body being the same length as that of *L. varius*.

mencement (duodenum). Towards its termination (ileum) it narrows considerably. Some of the solid viscera are small in proportion to the size of the intestinal coils. The pancreas affords a good example of this, the head of which occupies only a small part of the large duodenal loop.

The Jejunum and Ileum.—These coils, together with the duodenum, are attached by a well-defined mesentery, the root of which extends from the upper border of the first lumbar vertebra downwards to the right iliac fossa, measuring 2·5 cm. In the Lemurs which I dissected I observed that there was a quantity of fatty tissue contained between the two transparent layers of the mesentery. In the upper part of the jejunum villi are numerous and well marked. In the rest of this sub-division of the intestine the villi are smaller and less numerous. Valvulæ conniventes are confined to the duodenum. Peyer's patches seemed to be absent from the jejunum and greater part of the ileum, although I detected a few feebly marked ones near the ileo-cæcal valve. Numerous small villi beset the mucous membrane of the ileum.

Calibre of the ileum = 9 to 14 mm.
Do. do. jejunum = 5 to 7 mm.

Total length of small intestine = 24 inches, of which 6¼ inches belong to the duodenum.

The Duodenum.—This part of the alimentary canal is rather L shaped with the angle rounded off. It may be conveniently divided into two stages. The first includes the longer and vertical limb; the second, much shorter, crosses the spine almost in a transverse direction *at the level of the fourth lumbar vertebra,* terminating in this respect at a comparatively lower level than the duodenum of Man.

Relations.—The vertical limb, which is four inches in length, is lodged, for the most part, in the hepatic recess alongside of the pylorus. At its commencement the

duodenum abuts against the gall-bladder. Emerging from the hepatic recess, it is directed downwards and slightly backwards, coming into close contact with the lower part of the right lobe of the liver and the front of the right kidney. The latter organ exhibits a distinct impression of the duodenum. The right ureter, where it emerges from the hilum of the kidney, is related to the duodenum posteriorly. Below the liver a portion of the stomach lies in front of both stages of this part of the intestine. The head of the pancreas is related to the inner side of the vertical stage of the duodenum, whereas the second stage is not directly related to the pancreas. Thus the pancreas and duodenum in the Lemur differ in their relations to each other from the same organs in the human subject. The hilum of the right kidney projects to the inner or left side of the vertical stage: the portal vein, hepatic artery, and common bile duct being posterior relations. The transverse limb is only 2¼ inches. It begins immediately below the right kidney, and seems, by the course it pursues, *to correspond to the third stage of the duodenum in Man.* From right to left it ascends very slightly. The inferior vena cava and the aorta lie behind it; the stomach and transverse colon are situated in front[a] (*vide* Plates III., IV. (B.), and V. (B.)). The calibre of the duodenum is wide; when moderately distended it measures from 10 to 20 mm. In Man the calibre is from 35 to 50 mm., being narrower in proportion.

The mucous membrane is everywhere beset with numerous large and well-marked villi, but in the Lemurs which I dissected the valvulæ conniventes were few in number and feebly developed.

The characteristics of the Lemurine duodenum may be summarised as follows:—

[a] For relations of duodenal-jejunal flexure see p. 460.

1. Its peculiar L shape.

2. The incomplete mode in which it embraces the head of the pancreas, due to the discrepancy in size between the head of the latter viscus and the curve of the former.

3. Its complete investment by peritoneum along its whole length.

4. Its large calibre.

THE LARGE INTESTINE.

This part of the alimentary canal is relatively long. If the tapering 'vermiform appendix' be included in the measurement of the cæcum the total length of the large intestine amounts to 23½ inches, or half an inch less than the small intestine. The transverse colon, which is curved, is a short segment of the tube; it is 2 inches in length.

The hepatic and splenic flexures are not very pronounced. The former reaches to a higher level than the latter, *contrary to the condition found in Man.* The descending colon passes over the brim of the pelvis into the rectum, almost in a straight line; the sigmoid loop is therefore not represented. The whole length of the large intestine is completely invested by peritoneum, so that the different parts of the colon and the cæcum, being swung by a mesentery, enjoy a considerable amount of movement.

Mucous Membrane.—This presents no peculiarities, except that here and there (especially in the cæcum) it is folded, resembling valvulæ conniventes. On examining these folds I found that they were not permanent; by stretching the gut they could be obliterated. They were probably produced by contraction of the external longitudinal muscular bands. In two young dog-faced baboons I found the mucous membrane of the lower part of the colon in the same condition. These apes were thoroughly hardened with 10 per cent.

solutions of formalin repeatedly injected through the femoral arteries. In *Lemur varius* a few solitary follicles could be detected in the ascending colon.

THE DIFFERENT PARTS OF THE LARGE INTESTINE.

The Cæcum.—This viscus varies so much, even in allied species, that a study of its form and position seems to offer but little help towards the classification of animals according to their structural affinities. In the order of *Prosimiæ* (Lemurs), which in itself is limited, we find that the extent of variation, especially with regard to the length of the tapering apical or 'appendix-like' portion, is very marked. This is noteworthy, considering that practically all the members of the *Lemurine* group partake of a somewhat similar diet—viz., a mixture of insects, eggs, small animals, and vegetables—for which reason it might be expected that the length of the cæcum, including its 'vermiform' portion, should not vary to any great extent. However, an examination of even a few genera proves the contrary to be the case.

Galeopithecus lives on insects, larvæ, eggs, small animals, fruits, and leaves, and it possesses a long and large cæcum, about $\frac{1}{12}$th the length of its body.

Chiromys is particularly partial to sugar canes, but also preys upon insects and larvæ. Its cæcum is still longer in proportion, being $\frac{1}{8}$th the body length.

Stenops feeds principally on small birds and insects, yet its cæcum varies according to species. In *S. javanicus* it is long, and terminates in a narrow 'vermiform' process; in *S. tardigradus* this process is relatively short.

The *Galagos* feed on mice, small birds, insects, sweet fruits and juices; some of them possess a long and wide cæcum without a constricted 'vermiform' portion (*G. moholi*); in others (*G. calabariensis*) the cæcum is quite short.

The cæcum of *Tarsius* (a lemur which chiefly preys upon insects and lizards) resembles that of the last species.

In *Lemur varius* and in *L. flavifrons*, I found that the cæcum, taken in conjunction with its long 'vermiform' part, measured 8 inches, or a little less than half the body length.

Other genera might be cited, but the above are a sufficient number to show the extent of variation in the form of this part of the alimentary canal.

Cæcum of Lemur Varius: Position and Relations.—When distended with gelatine it resembles a long, narrow cone, bent upon itself in such a way that the 'vermiform' part extends upwards, lying alongside and parallel to the basal end, as well as to the ascending colon. The point of the 'appendix' touches the duodenum where the latter crosses the fourth lumbar vertebra (Plate V. (B.), C.). The ileum, guarded by a valve of two segments, opens into the cæcum almost at a right angle. The opening is situated in the lumbar region, above the brim of the pelvis and close to the commencement of the ascending colon. Unlike the human cæcum, which normally is limited to the right iliac fossa, that of the Lemur, which is large in proportion to the iliac fossa, extends upwards into the right lumbar, hypogastric, and umbilical regions of the abdominal cavity. The tapering part—not a true vermiform appendix—shows no constriction marking it off from the rest of the cæcum. It gradually narrows towards its apex. Three inches below the ileo-cæcal valve its calibre is reduced to 11 mm.—*i.e.*, much the same as that of the lower end of the ileum. At its apex the 'appendix' just admits the point of a porcupine quill. As it proceeds upwards it crosses in front of the right ureter at the level of the fifth lumbar vertebra (Plate V. (B.), U., C.).

The Ileo-cæcal Valve.—The entrance from the ileum into the cæcum closely resembles that of the human subject.

The valve guarding it consists of two segments—an upper and a lower. The segments ares trongly built, with thick walls.

The Ascending Colon.—This segment of the large intestine having much the same calibre as the upper part of the cæcum, and both possessing a mesentery, it is questionable where one ends and the other begins. From the highest point of the iliac crest to the lower pole of the right kidney the large intestine (upper part of the cæcum and ascending colon ?) measures 2½ inches. Immediately above this it bends gradually forward into the hepatic flexure, which rests upon the front of the right kidney and touches the lower end of the right lobe of the liver. The termination of the hepatic flexure crosses in front of the transverse part of the duodenum. (Plate IV. (B.), C.). Between the iliac crest and right kidney the colon rests upon the 'vermiform' appendix which separates it from the right ureter.

The Hepatic Flexure.—The relation established between this part of the alimentary canal and the right lobe of the liver is not very intimate. In neither *Lemur varius* nor *L. flavifrons* did I find definite impressions on the liver produced by the gut. The feeble bend of the colon which constitutes the flexure in question barely touches the extreme lower end of the right lobe of the liver (*vide* Ascending Colon).

Its relations to the other neighbouring viscera are :—

In front.—Stomach.

Behind.—Right kidney; Duodenum (*vide* Ascending Colon).

The Transverse Colon.—The term transverse colon can hardly be applied with tolerable accuracy to the part of the large intestine which crosses the abdominal cavity. From the hepatic to the splenic flexure the intestine pursues a curved course. In both *Lemur varius* and *L. flavifrons* I found it was somewhat U shaped. The length of the curve

varied in the three specimens which I dissected. In *Lemur flavifrons* it was 4 inches long, reaching nearly to the symphysis. In the male of *L. varius* it was only half that length, the stomach completely covering it in front. In the female of *L. varius* it measured 2¼ inches.

The Splenic Flexure.—As before stated, this part of the large intestine is placed at a lower level than the hepatic flexure; *the opposite to the condition found in Man.* It is related to the lower third of the anterior surface of the spleen, upon which it rests, whilst the fundus of the stomach partially covers it in front.

The Descending Colon and Rectum.—The remainder of the large intestine—*i.e.*, from the splenic flexure to the anus—takes a rather straight course downwards. Above the brim of the pelvis it is placed close to the left side of the vertebral column: below this it inclines to the right, so that the rectum (the part of the colon below the brim of the pelvis) occupies a mesial position, which it maintains for the rest of its course.* The tube gradually narrows until the 'rectal' pouch is reached. Here the rectum widens considerably, having a calibre of 18 mm.

Relations.—(*A.*) *Descending Colon.*—Anteriorly it is covered by coils of the small intestine, except the lower portion of the ileum, which runs external and parallel to it. The left ureter descends on its posterior aspect (Plate V. (B.), IL., D C., U.).

(*B.*) *Rectum.*—The sacrum and coccyx support it behind, the ureters descending on either side. In the male the bladder, seminal vesicles, and prostate are related in front and above the "rectal pouch," below which the rectum is related anteriorly to the urethra and bulb of the penis (Plate II.).

In the female the uterus and vagina intervene between the front of the rectum and the back of the bladder and

* I found this to be the case in both *Lemur varius* and in *L. flavifrons.*

urethra. In both sexes the greater part of the 'rectal' pouch lies below the reflection of peritoneum.

Total length of large intestine,	23½ in., or	58·7 cm.
Length of cæcum,	9½ in., or	23·7 cm.
,, ascending colon,	2½ in., or	6·5 cm.
,, hepatic flexure,	2½ in., or	6·5 cm.
,, transverse colon,	2 in., or	5 cm.
,, splenic flexure,	1½ in., or	3·7 cm.
,, descending colon, (to brim of pelvis.)	3 in., or	7·5 cm.
,, rectum,	2½ in., or	6·2 cm.
Amount covered by peritoneum (rectum),		4 cm.

Solid Viscera.

THE LIVER.

This is a rather irregularly shaped organ, which seems to differ in form according to species.

In *Lemur varius* it is long and narrow, the left side being deeply excavated for the reception of the stomach.

Lobes.—The right, left, and cystic lobes are distinct, being separated by deep fissures. The left is but partially subdivided by two short fissures in front and behind. On the under surface of the right lobe are two smaller processes of liver substance; these, from their position, seem to correspond to the *lobus spigelii* and *quadratus*. The former of the two is an elongated pointed process (3·5 cm.), which springs from the left posterior angle, behind and to the left of the hilum. Of the three primary lobes the cystic is the largest. It is partially subdivided by the suspensory notch.

In *L. flavifrons* the left lobe is only faintly notched behind, showing no further sign of subdivision. Moreover, in the specimen which I dissected, the posterior surfaces of the cystic and left lobes appeared to blend to a small extent.

The former, together with the right lobe, was again divided into three processes. One of the processes of the cystic lobe was much smaller than either of the other two.

I noticed that the liver of *L. flavifrons* was broader and shorter than that of *L. varius.*

In *Chiromys,* according to Owen, neither the right nor left lobe is subdivided, although the cystic is distinct and separate. In this animal the left lobe is the largest.

Fissures and Grooves.—The fissure for the inferior vena cava on the posterior surface of the right lobe is well marked, and measures 5 cm. in length. It is converted into a tunnel for a short part of its course by a bridge of liver substance. The transverse fissure (hilum) is narrow, so that the structures entering and leaving the liver are very close together. Of these, the hepatic artery occupies the most anterior position.

The bile duct comes next, being placed to the right of and slightly behind the artery, while the portal vein lies behind and between both. The suspensory or longitudinal fissure, which is 2 cm. in length, partially divides the anterior surface of the cystic lobe. On the back of the left lobe there is a groove (1·5 cm. in length), which lodges the intra-abdominal stage of the œsophagus.

The fissure for the gall-bladder is situated in the upper part of the right margin of the cystic lobe and looks into the hepatic recess. It is rather irregular in shape, being constricted about its middle, and wider below than above (Plate IV. (B.), G. B.).

Peritoneal Relations.—The liver receives a large investment of peritoneum, but on its posterior surface there is a limited area uncovered. This is bounded by the superior and inferior coronary ligaments, which, meeting at the right and left extremities of the organ, form the lateral ligaments. The suspensory ligament is lodged in a fissure of the same name (*vide supra*).

Position in the Abdominal Cavity.—The greater part of the liver lies under shelter of the lower costal arches, but the extremity of the right lobe extends a little below the thirteenth rib. The cystic reaches the eleventh costal cartilage; the left lobe the twelfth. The lower border of the left lobe is thin and sharp, and part of it crosses the middle line, so that the bulk of the liver is situated on the right side of the body. The superior surface is highly convex, extending up to the sixth costal cartilage in front. It is composed of the cystic lobe, and occupies the greater part of the cupola of the diaphragm (*vide* Part I., p. 673).

Relations.—The left lobe is deeply sculptured out for the reception of the stomach. The lesser curvature of the latter is covered in front by the overhanging lower margins of the left and cystic lobes. The duodenum and pylorus are lodged in *the elongated hepatic recess.* The right kidney and its suprarenal body leave a single deep impression on the under surface of the right lobe of the liver. The impression of the hepatic flexure is barely perceptible, seeing that this part of the gut is not intimately related to the under surface of the liver (Plate IV. (A.) and (B.), L., L., L.).

GALL-BLADDER AND HEPATIC DUCTS.

The gall-bladder is a narrow, rather pyriform bag, partially twisted on itself, and gradually tapering into a very long coiled cystic duct, which in turn is joined by several smaller hepatic ducts emerging from the subdivisions of the cystic and right lobes. The duct of the gall-bladder terminates by joining a larger one which receives several smaller biliary tubes passing from the cystic and left lobes.

The junction of the cystic and larger ducts forms the common bile duct. At the hilum of the liver it is placed to the right of and slightly behind the hepatic artery. Pursuing its course downwards, the common bile duct passes

between the two layers of the gastro-hepatic omentum and behind the duodenum, until the upper third of the vertical stage is reached. It then pierces the wall of the duodenum and is joined by the pancreatic duct (see Pancreatic Duct, p. 462).

Relations.—The gall-bladder and upper portion of the cystic duct abut against the duodenum, as it lies in the hepatic recess (Plate IV. (B.), G. B.).

Position.—The cystic fissure has been described. In *Lemur flavifrons*, the form, position, and relations of the gall-bladder and hepatic ducts closely resemble those of *L. varius*, except that in the latter species the cystic duct is longer and more convoluted. In *L. flavifrons* the common bile duct is only half as long as that of *L. varius*.

Lemur varius.—Length of gall-bladder,	-	3 cm.
,, cystic duct,[a]	-	16 cm.
,, common bile duct,	-	4 cm.
Lemur flavifrons.—Length of gall-bladder,	-	3 cm.
,, cystic duct,	-	9 cm
,, common bile duct,	-	2 cm.

Observe—The gall-bladder is the same length in the two species.

THE SPLEEN.

Considering that this organ, during the process of development from mesoblast within the substance of the mesogastrium, slowly grows out along the paths of least resistance, it is not surprising to find it presenting great variation both in shape and position, even in closely allied animals.

The *Lemurian* spleen follows the quadrupedal type rather than that of *Anthropoids*. In *Chiromys* it is an elongated trihedral body, bent at almost a right angle on itself, the lower part being nearly half the length of the upper part (Owen). In *Lemur varius* I found that the bend was less

[a] The cystic ducts were unravelled before their measurements were taken.

pronounced, giving the organ a more curved outline. In *L. flavifrons*, in addition to being curved, the spleen appeared to be twisted on its long axis. The shape is straight and rather long in *Platyrhine* monkeys. In *Catarrhines* it is shorter, thicker, and with a tendency to broaden out. I noticed this in the spleen of the following apes :—

1. *Cynocephalus mornon.*
2. *Cynocephalus babuin.*
3. *Cynocephalus sphinx.*
4. *Macacus innuus.*

The anthropoid and human spleens bear a resemblance to one another. In the *gibbon* this viscus is rather triangular in outline. The inner surface is marked with the impressions of neighbouring viscera. Among other orders of mammals the spleen varies to such a degree that space will only permit of a brief description of a few of the better known types. In the order *Rodentia* it is often a thin, long-shaped structure, but in some rats I noticed a tendency to a triangular shape. In porcupines and agoutis it ranges from round to oblong (Owen). Curiously enough, according to Hunter,[a] the capibara and human spleens closely resemble each other in shape. Among the *Cetaceans* it is usually multilobed. In *Ruminants* it is elongated and flattened.

In a deer, the body of which measured 19 inches, I observed that the spleen was very small and chiefly related, on its inner side, to the stomach. In *Carnivora* there is much variation. In the young cat I found it to be an elongated and somewhat curved viscus; whereas in a terrier dog[b] (18 inches in length) the spleen was rather three-sided in outline, the angles being prolonged into pointed processes.

[a] *Vide* Owen. Comparative Anatomy of Vertebrates. Vol. III., p. 560.

[b] The spleen of a setter dog described by Owen was oblong. *Ibid.*, p. 561.

The spleen of the fox appeared less angular and longer than that of the dog.

Position and Relations.—The spleen of *Lemur varius* is crescentic in shape. It presents three distinct surfaces—a posterior, partially covered by the pleura, the diaphragm intervening, and crossed by the twelfth and thirteenth ribs; an extensive anterior surface, the upper two-thirds of which is related to the fundus of the stomach, the lower third to the splenic flexure of the colon; and an inner concave surface which is tucked round the outer and convex border of the left kidney. The surfaces are separated by three borders. Of these, the outer is notched and convex, and longer than either the anterior or posterior, which are concave in shape. The termination of the duodenum, where it turns forward to form the duodeno-jejunal flexure, almost touches the lower extremity or pole of the spleen. (See page 449.)

In the female of *Lemur varius* I found that the tail of the pancreas reached to the anterior border of the spleen, a little below its middle. In the male the pancreas (being shorter) did not touch the spleen (Plates III., S.; IV. (A.), SP.; V. (B.), S.).

Relations to the Vertebral Column.—The long axis appears to be more vertical than that of the human subject, and the organ is placed relatively lower down in the abdominal cavity. The upper pole reaches to the level of the head of the thirteenth rib. The lower pole extends downwards to the level of the transverse process of the fourth lumbar vertebra. The upper one-fourth of the posterior surface, as it lies under the pleura and diaphragm, is crossed by the twelfth and thirteenth ribs and their costal cartilages. The markings of the ribs are evident on this part of the spleen.

Length of the spleen	-	-	8 cm.
Breadth ,, ,,	-	-	2 cm.
Thickness ,, ,,	-		1 cm.

THE PANCREAS.

Like the spleen, the pancreas is a viscus which varies to a great extent. Its shape seems to depend a good deal upon the way that it is moulded by the pressure and counter-pressure of neighbouring viscera. It frequently exhibits remarkable differences in form, even in the same species of animal.

In *Lemur varius* the pancreas of the male (which I dissected) was longer and narrower than that of the female. In the former, however, immediately to the right of the inferior vena cava, the pancreas expands a little, sending a short, pointed process upwards, in front of the right kidney to the lower border of the suprarenal capsule. Proceeding further towards the right, it tapers, and then expands again, a deep notch being thus formed between the two thickenings (Plate III.). Finally it turns sharply downwards for a short distance along the inner side of the vertical stage of the duodenum. This portion constitutes the "lesser pancreas." It terminates in several fringed processes, which extend below the level of the common entry of the bile and pancreatic ducts. The duodenal end of the pancreas in the female is expanded also, but not deeply notched, nor are the fringes of the "lesser pancreas" so marked; in fact, they are represented by three short and rather thickened processes which diverge from each other.[a] This is not unlike the pancreas of *Chiromys*, described by Prof. Owen as "a broad, thin gland, extending and expanding from near the spleen to the duodenum, and thence continued, as the small pancreas, a little way beyond the entry of the duct, which is close to that of the gall duct; here the gland sends off some short, narrow processes into the folds of the mesentery."

Position and Relations.—The main part of the gland stretches obliquely downwards, across the abdominal cavity

[a] The pancreas is such a variable organ that this description must not be taken as general. It refers only to the shape of the pancreas of the female Lemur which I dissected.

from right to left, crossing the second lumbar vertebra. The posterior relations are:—

Right kidney.
Inferior vena cava.
Aorta.
Left suprarenal capsule.
Left kidney.

The left extremity or "tail" is related to the anterior border of the spleen.[a] The stomach is situated in front, and by the backward pressure that it exercises when distended the pancreas becomes flattened to a considerable extent.

Unlike the human subject, neither the flexure duodeno-jejunalis nor the transverse colon is related to the inferior aspect of the Lemurine pancreas.

Dimensions of the Pancreas.

Male.—	Length (omitting the lesser pancreas)	5·5 cm.
	Breadth (above downwards) - -	6 mm.
	Thickness (dorso-ventral) - -	2 mm.
	Length of "lesser pancreas" - -	2·5 cm.
Female.—	Length (omitting the lesser pancreas)	5 cm.
	Breadth (above downwards) - -	8 mm.
	Thickness (dorso-ventral) - -	2 mm.
	Length of "lesser pancreas" - -	1·5 cm.

N.B.—In both sexes the distance between the upper border of the pancreas and the commencement of the duodenum measures 3 cm.

THE PANCREATIC DUCT.

This canal begins at the splenic end of the pancreas and travels in the direction of its long axis, towards the duodenum. It lies embedded in the substance of the gland, and receives several tributaries from the processes of the "lesser pancreas." It is of a whitish colour, and, at its termination, has acquired a calibre which exceeds that of the common bile duct. Its

[a] In the female only. (*Vide* p. 460).

length is about 6·5 cm. It runs obliquely downwards in the substance of the duodenal wall for a distance of 6 mm., and then joins the common bile duct. Before piercing the duodenum, the latter is placed at a lower level than the pancreatic duct.

Length of the common bile duct within the substance of the duodenal wall, 6 mm.

Length of the common pancreatico-bile duct within the substance of the duodenal wall, 5 mm.

Position of the common orifice of the two ducts, 4 cm. below the commencement of the duodenum. The opening is situated on the postero-internal aspect of the gut.

THE KIDNEYS.

The kidneys of the Lemur conform to those of the higher mammalian type. Their surfaces show no signs of lobulation. The superior and inferior extremities are rather blunted and about of equal thickness. The convex outer border of the left kidney is flattened so as to form a surface which is clasped by the concave surface of the spleen (*vide* Plate III.). This kidney, therefore, presents three surfaces[a]—an anterior, which looks forwards and outwards; a posterior, looking inwards and backwards; and, between these, an external surface. Separating the surfaces are three borders—an anterior, directed forwards and outwards; a posterior looking backwards and outwards, both of which are rounded and ill-defined; the third or internal border looks forwards and inwards, and about its middle the *hilum* is situated.

Relations.—The posterior surface is distinctly mapped out by a conspicuous longitudinal ridge, into an inner and an outer area, which, inclining forwards, give a bevelled appearance to the back of the kidney. These sloping or bevelled

[a] I found three surfaces present on the left kidney of *Lemur flavifrons* also.

districts are produced by the pressure and counter-pressure of neighbouring muscles. The inner area is in contact with the psoas; the outer with the quadratus lumborum, and, in the case of the right kidney, with the posterior and lower part of the diaphragm also.

Anterior Surface of the Right Kidney.—This is flatter than the corresponding surface of the left kidney. Four viscera are related to the front of the right kidney. They are:—

The liver.
The pancreas.
The hepatic flexure of the colon.
The duodenum.

The pancreas crosses the hilum to reach the duodenum. In man, the duodenum is usually situated in front of the hilum, so that the pancreas fails to reach the right kidney. The colic impression, which occupies the lower one-fourth of the anterior surface, is rather oblique, forming an inferior inclined plane.

Anterior Surface of the Left Kidney.—Two pronounced sloping planes are manifest—an upper, produced by the stomach; and a lower, by the colon. Between these the pancreas is related to the front of the left kidney (Plate III.).

Inferior Relations.—These have been described on page 444.

Superior Relations.—The suprarenal bodies situated above the upper poles of the kidneys will be described separately. The relations of the pleura and diaphragm to the kidneys have been dealt with on page 443.

Position in the Abdominal Cavity.

Right Kidney.—This is placed at a higher level than the left kidney.

The upper end reaches to the level of the upper border of the first lumbar vertebra, and is 7 cm. distant from the highest point of the iliac crest; the lower end extends to

the lower border of the second lumbar vertebra. The hilum is opposite the upper border of the second lumbar vertebra, and is 2·5 cm. distant from the middle line.

The thirteenth rib lies immediately above the posterior surface of the right kidney.

The tip of the thirteenth costal cartilage is opposite the hilum.

Left Kidney.—The upper pole of the left kidney extends to the upper border of the second lumbar vertebra, and is 6 cm. distant from the highest point of the iliac crest; the lower pole reaches to the middle of the third lumbar vertebra. The hilum is opposite the lower border of the second lumbar vertebra, its distance from the vertebral column (middle line) being the same as that of the right kidney.

Dimensions.

		Female.	Male.
Left Kidney.—	Length	3·5 cm.	3·7 cm.
	Breadth	2·2 cm.	2·2 cm.
	Thickness	2 cm.	2 cm.
Right Kidney.—	Length	3·5 cm.	4 cm.
	Breadth	2·7 cm.	2 cm.
	Thickness	1·5 cm.	1·5 cm.

Observe—The left kidney in male and female is thicker than the right kidney. This is brought about by the pressure exerted by the spleen in a direction from without inwards, causing the convex outer portion of the kidney (the outer border of the human kidney) to become thickened into a distinct splenic surface.

From the above measurements it may be seen that both the right and left kidneys of the male exceed (in length) those of the female, although the breadth is much the same in both sexes.

The kidneys of *Lemur varius* appear to be small when com-

pared with the other abdominal viscera; also in *L. flavifrons*, as may be seen by the following measurements:—

	Right	Left.
Length	2·7 cm.	2·9 cm.
Breadth	1·6 cm.	1·5 cm.
Thickness	1·2 cm.	1·4 cm.

Renal Vessels and Duct.—In both *Lemur varius* and *L. flavifrons* the left renal vein is more than double* the length of the right one. At the hilum the renal structures are arranged in the same order as in the human subject—viz., vein, artery, duct or ureter, in the order from before backwards.

THE URETERS.

The portions of the intestine which lie in front of the ureters have been mentioned on page 444. Leaving the hilum of the kidney each ureter descends on the psoas muscle to the brim of the pelvis. In the male the duct is continued over the external iliac artery, until it reaches the bladder, which it enters immediately above the top of the prostate.

In the female, the ureter, on entering the pelvis, crosses over both external and internal iliac vessels, and thence by the side of the uterus and vagina to the bladder, which it enters close to the commencement of the urethra. In both sexes the ureters pierce the bladder wall very obliquely (Plate II., Ur.; Plate V. (B.) U.).

Length of Ureters.

		Male.	Female.
Lemur varius.—	Right ureter	14·5 cm.	15 cm.
	Left ureter	13·5 cm.	14·2 cm.
Lemur flavifrons.—	Right ureter	8·5 cm.	—
	Left ureter	11 cm.	—

* Left renal vein of *Lemur varius* = 2·2 cm.
Right " " " = 6 mm.
Left renal vein of *L. flavifrons* = 3 cm.
Right " " " = 1·4 cm.

THE ADRENAL BODIES.

Unlike the adrenals of man, those of *Lemur varius* do not touch the upper poles of the kidneys. They are separated by large pads of firm, fatty tissue, which, in position and form, resemble the human adrenals. The pads of fat are rather triangular in shape, with excavated bases, which receive the upper ends of the corresponding kidneys. The adrenal bodies are somewhat elongated and flattened, their lower ends being slightly embedded in the apical and inner portions of the pads of fat. Each adrenal is situated closer to the mesial plane than the upper end of its corresponding kidney, the left more so than the right.

Position and Relations.—The inferior vena cava and under surface of the right lobe of the liver are in relation to the anterior surface of the right adrenal. The stomach lies in front of the left one, but, unlike the human subject, neither spleen nor pancreas is related to it. In the Lemur the adrenals are supported posteriorly by the crura of the diaphragm. From the inferior aspect of the left adrenal a large vein issues which joins the renal vein of its own side. The right adrenal extends to the level of the upper border of the thirteenth dorsal vertebra; the highest point of the left is opposite the middle of the first lumbar vertebra (Plate III., R.S.C., L.S.C.).

Dimensions.

	Right.	Left.
Length	1·2 cm.	1·5 cm.
Breadth	6 mm.	4 mm.
Thickness	3 mm.	3 mm.

Observe—The left is longer and narrower than the right, while both are of equal thickness.

Pelvic Viscera.

The position and relations of the rectum have been described with the descending colon (*vide* p. 454).

THE BLADDER.

This organ differs but little in shape in the two sexes. It is more or less pyriform, the lower end being narrower than the upper. It is somewhat broader in the male than in the female. When empty, its long axis is directed from above downwards and backwards. The walls of the bladder are strong and thick, and after the urine is expelled the mucous membrane is markedly sacculated, and the lumen, in both sexes, is represented by an elongated slit, with which the urethra becomes continuous in a straight line.

Position.—Many of the abdominal and thoracic viscera are placed *at a relatively lower level in the Lemur than in Man* (*vide* Part I., pp. 665–672). This is not so in the case of the bladder. The position of this organ in *Lemur varius* closely follows that of the human infant, being thus placed at a higher level than in the adult.

In the male the urethra emerges from the bladder at the level of the upper border of the symphysis. In the female the commencement of the urethra is situated a little lower down. Almost the entire organ projects above the pelvic brim, the superior extremity reaching to the level of the upper border of the second sacral spine.

Relations.—The peritoneal relations have been dealt with. In the male the large seminal vesicles separate the lower part of the posterior surface of the bladder from the front of the rectum. The vas deferens and ureter are placed at either side, while the prostate embraces the lower and tapering end. The front of the bladder comes into contact with the posterior aspect of the anterior abdominal wall. The upper part of the posterior surface, together with the superior extremity, are separated from the rectum by coils of the small intestine (Plate II. (B.)).

The posterior surface of the female bladder is separated along its whole length from the rectum by the median

portion of the uterus and the vaginal canal. The superior extremity[a] projects a little above the bifurcation of the uterus into its two cornua. The termination of the ureters in the bladder wall has been described in both sexes.

Dimensions of the Empty Bladder.

	Male.	Female.
Length	2·3 cm.	2·2 cm.
Breadth	1·8 cm.	1·2 cm.
Thickness	9 mm.	8 mm.

MALE ORGANS OF GENERATION.

Prostate.—This is a large gland when compared with the size of the bladder. It is conical in shape, with its base, which is partly divided into two lateral lobes, looking upwards. The greater part of the body of the prostate embraces the commencement of the urethra. Posteriorly, the gland is thickened so as to form a third lobe, which shows indistinct indications of a further subdivision into two portions.

Positions and Relations.—The prostate extends from the middle to the upper border of the symphysis pubis. From this it is separated by a pad of fat. It lies above and in front of the 'rectal' pouch. Between its posterior and lateral lobes, which partly embrace the lower end of the seminal vesicles, the common seminal duct opens into the urethra. In both *Lemur varius* and *L. flavifrons* the prostate is a strong and compact body. In the former species it is about 1·5 cm. in length, and about 1 cm. across its broadest part.

Seminal Vesicles.—These are also large proportionately. They consist of a pair of elongated, coiled tubes, occupying three turns of a spiral. Their position relative to the prostate, bladder and rectum has been described. When uncoiled they measure 2 cm. in length, with a calibre of 4 mm. The vasa deferentia near their termination lie along the inner

[a] In both sexes the peritoneum is reflected from the superior extremity of the bladder along the line of the urachus.

sides of the seminal vesicles. It is interesting to note that these structures are absent in *Chiromys* (Owen).

The peritoneal relations of the prostate and seminal vesicles have been described.

The Urethra.—The male urethra is 7 cm. in length. The portion which traverses the prostate measures 1 cm.; between the apex of the prostate and the bulb of the penis it is 2 cm. long, the spongy portion being 4 cm. The urethral canal is curved; it is concave behind, where it is related to the front of the 'rectal' pouch, and concave in front as it traverses the bulb of the penis.

The Vasa Deferentia.—These ducts measure about 10·5 cm. each. The intra-pelvic portions are 6 cm., the inguinal and scrotal, taken together, amount to 4 cm. In the pelvis the vasa deferentia cross internal to the external iliac arteries. They are at first related to the sides of the bladder, but towards their termination they are placed behind it. Here they lie to the inner side of the seminal vesicles, which they join to form a common seminal or ejaculatory duct, the position of which has been described.

The Testes and Penis.—The epididymis is well marked off from the *body* of the testes. The latter part is somewhat flattened from side to side. Each testis measures 4 cm. long and 2 cm. broad. The scrotum is only slightly pendant. In *Chiromys* it is sessile (Owen).

From the bulb to the end of the glans the penis is about 4 cm. The glans is somewhat expanded and rounded. A small ossicle is present, which is to be found in the penis of many other species of Lemur.

FEMALE ORGANS OF GENERATION.

Uterus and Vagina.—A bicornuate uterus is one of the characters of the members of the Lemurian order. Some genera also show an elongated, common utero-vaginal cavity

(*Tarsius, Stenops, Perodicticus*), and a clitoris perforated by the urethral canal. In *Chiromys*, the uterus is differentiated from the vagina, and the clitoris is distinct from the urethra (Owen).

In *Lemur varius* I found that the lower end of the bicornuate uterus projected into the cavity of the vagina in the form of two distinct lips (orificium externum uteri), one anterior, the other posterior. Above these lips the vaginal canal terminates in the form of two narrow recesses or 'fornices.' The single part of the uterus is situated in the middle line of the pelvis, between the bladder in front and the rectum behind. The cornua arise as angular projections from the upper end of the single part. Their origin corresponds to the level of the middle of the second sacral spine. They extend outwards and upwards in front of the rectum towards the lateral wall of the pelvis. Some coils of the small intestine and a considerable amount of fatty tissue intervene between the rectum and uterus. The peritoneal relations have been described.

Dimensions.

Uterus.—Single part - -	15 mm. in length
Left cornu - - -	14 mm. in length
Right cornu - - -	10 mm. in length
Vagina.—Total length - -	20 mm.
Amount covered by peritoneum (behind),	12 mm.
Amount covered by peritoneum in front,	14 mm.
Uncovered (behind) - -	8 mm.
„ (in front) - -	6 mm.

The clitoris is 6 mm. in length, and is perforated by the urethral canal; the latter measures 20 mm., *being much longer in proportion than that of the human subject.*

The Ovaries and Oviducts.—The ovaries are two small, oval-shaped bodies, with their sides rather compressed, the postero-external more so than the antero-internal. They measure 6 mm. long by 3 mm. broad. Each ovary occupies the lateral wall

of the pelvis of its own side. They are situated about 4 mm. above the summit of the empty bladder. The oviducts (Fallopian tubes) are convoluted, and partially embrace the ovaries. The former take a tortuous course inwards to reach the respective cornua of the uterus. The extremities of the oviducts are fimbriated; when uncoiled they measure 20 mm. in length.

Dimensions of the Pelvis.

Unlike the human subject, the size and form of the pelvis do not differ to any degree in the two sexes. Furthermore, the antero-posterior and transverse diameters of the brim are the same in the male and female—viz., 3 cm.

The diameters of the outlet are slightly greater in the female.

Male—Transverse, 1·7 cm. Antero-posterior, 2·2 cm.
Female—Transverse, 2 cm. Antero-posterior, 2·5 cm.
Length of the symphysis pubis in both sexes, 2·2 cm.

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See Part I., page 674, Transactions of the Royal Academy of Medicine in Ireland, 1899.

EXPLANATIONS OF THE PLATES.

Plate I.

STOMACH OF LEMUR.

From a photograph of a specimen hardened *in situ* with formalin and moderately distended with warm injections of gelatine.

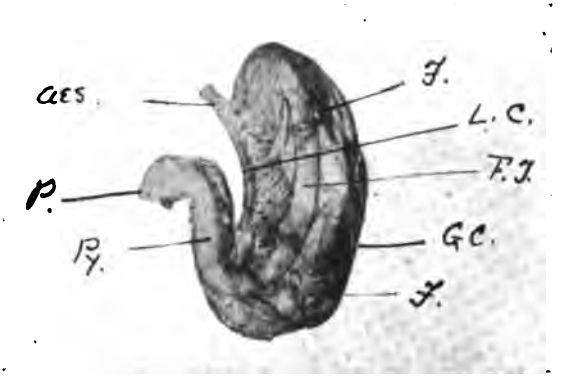
F. = Fundus.
Py. = Pylorus.
L.C. = Lesser Curvature.
G.C. = Greater Curvature.
Œs. = Œsophagus.
F.T. = Fibrous Band.
P. = Pyloric Opening.

Plate II.

Drawing of a mesial section through the Pelvis of the male Lemur.

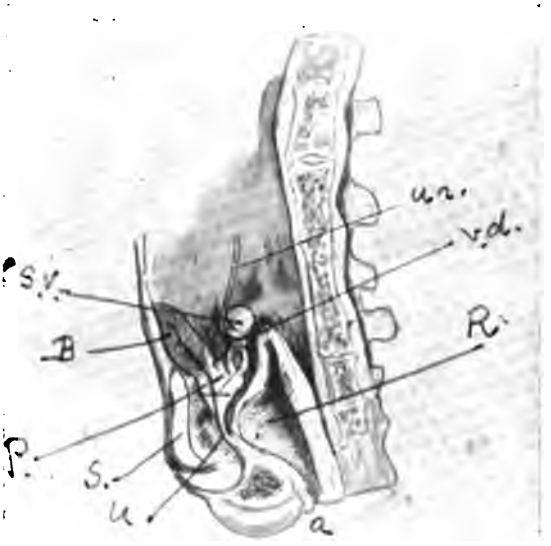
R. = Rectal Pouch.
B. = Bladder.
S.V. = Seminal Vesicle.
P. = Prostate.
U. = Urethra.
S. = Symphysis.
A. = Anus.
Ur. = Ureter.
V.d. = Vas deferens.

Plate I.



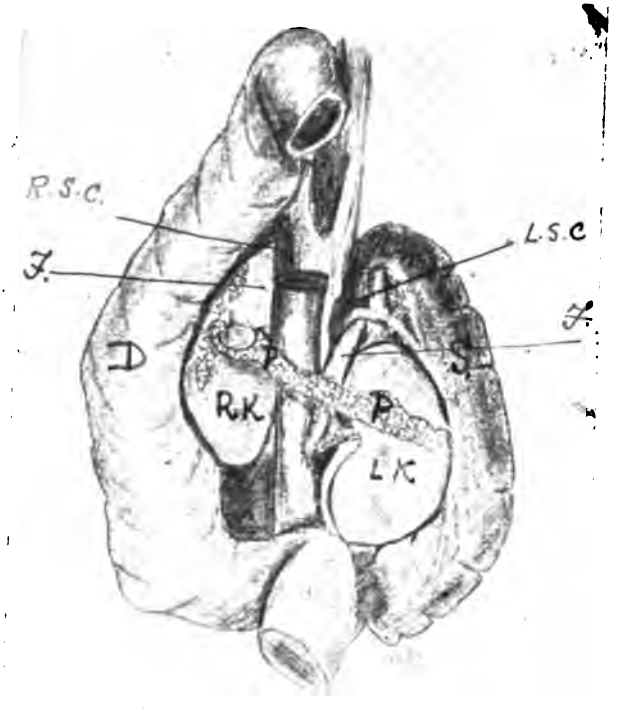
Stomach of Lemur.

Plate II.



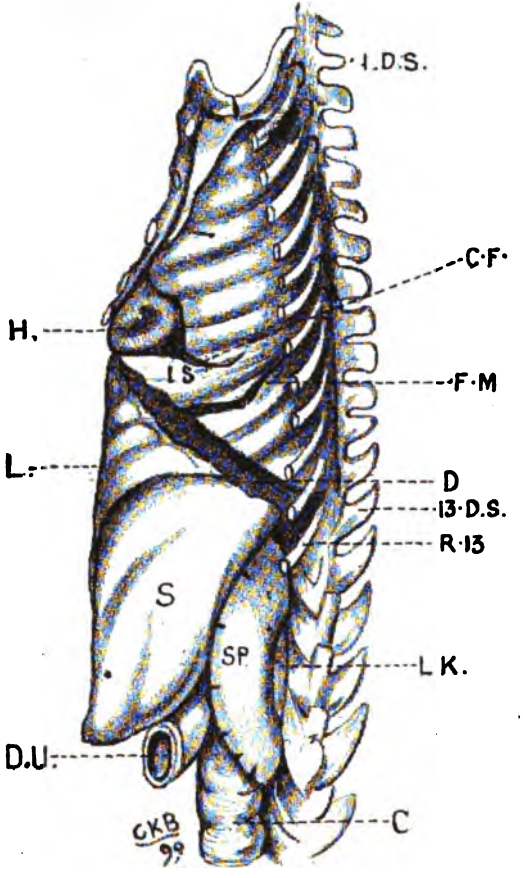
Mesial Section of Male Pelvis of Lemur.

PLATE III.

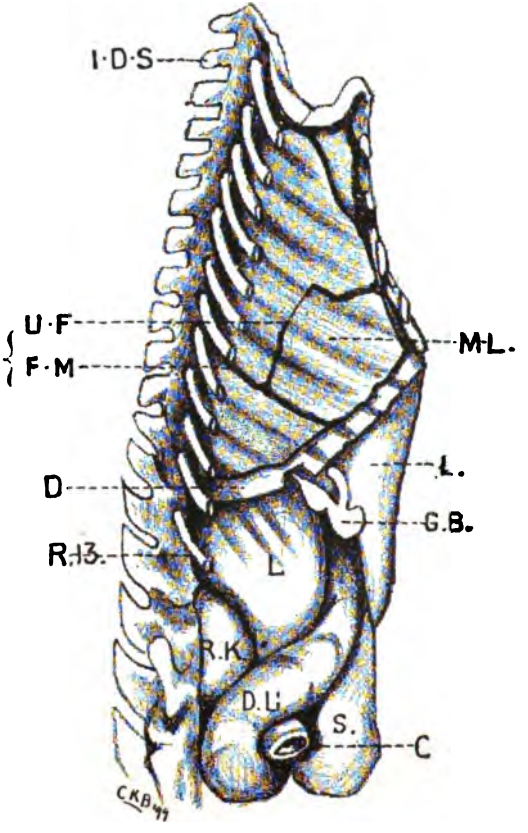


The Duodenum, Pancreas, Kidneys, Adrenals, and Spleen.

PLATE IV.

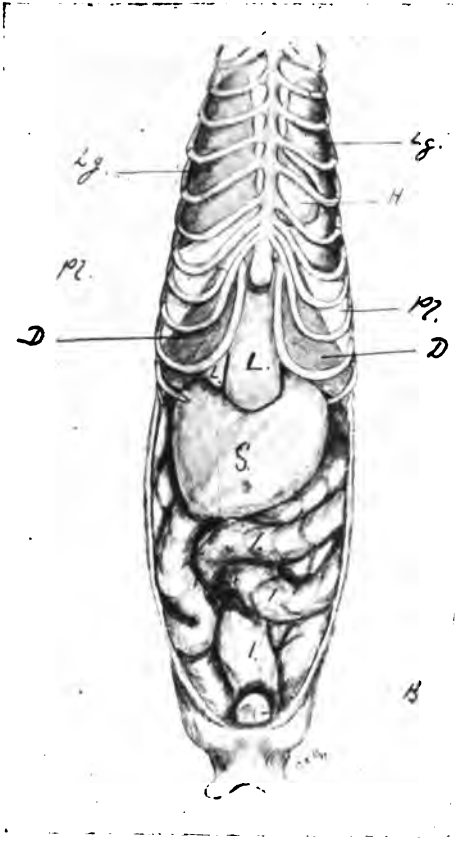


(A.)



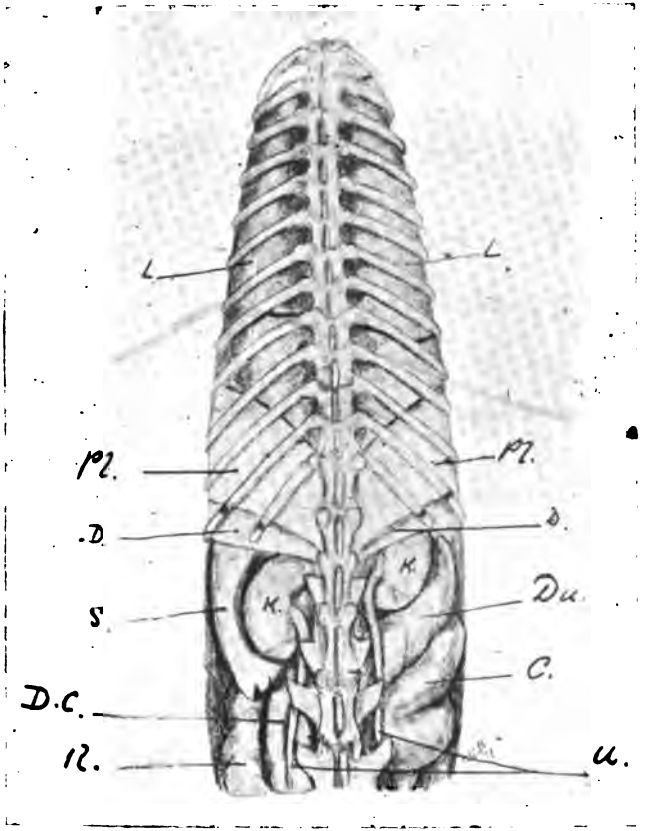
(B.)

Side View of the Thoracic and Abdominal Viscera of the Lemur.



(A.)

Front View of the Thoracic and Abdominal Viscera of the Lemur.



(B.)

Back View of the Thoracic and Abdominal Viscera of the Lemur.

Plate III.

Drawing of the Duodenum, Pancreas, Kidneys, Adrenals and Spleen.

D. = Duodenum.
P. = Pancreas.
R. K. = Right Kidney.
R.S.C. = Right Adrenal.
L.K. = Left Kidney.
L.S.C. = Left Adrenal.
S. = Spleen.
F.F. = Fat between Adrenals and Kidneys.

Plate IV.

Two drawings of the Thoracic and Abdominal viscera, as seen in profile. They illustrate the topography of the organs and their relations to the vertebral column :—

(A.) Left Side.

1. *D.S.* = 1st Dorsal Spine.
13. *D.S.* = 13th Dorsal Spine.
*R.*13 = Rib 13.
Lung {*C.F.* = Cardiac Fissure.
Lung {*F.M.* = Main Fissure.
D. = Diaphragm.
H. = Heart and Pericardium.
L. = Liver.
S. = Stomach.
DU. = Duodenum.
SP. = Spleen.
L.K. = Left Kidney.
C. = Colon.
IS. = Isthmus of the Upper Lobe of the Lung.

(B.) Right Side.

1. *D.S.* = 1st Dorsal Spine.
*R.*13 = Rib 13.
Lung {*F.M.* = Main Fissure.
Lung {*U.F.* = Upper Fissure.
D. = Diaphragm.
L. = Liver.
G.B. = Gall Bladder.
R.K. = Right Kidney.
DU. = Duodenum.
S. = Stomach.
C. = Colon.
M.L. = Middle Lobe of Lung.

The position of the fissures of the lungs, also the impressions for the ribs, are very marked.

Plate V.

Two drawings of the Thoracic and Abdominal viscera. *A.* From the front. *B.* From behind. The latter shows the relations of the organs to the vertebral column.

(A.)

H. = Heart.
Lg. = Lung.
Pl. = Pleura.
LL. = Liver.
S. = Stomach.
B. = Bladder.
I. = Small Intestine.
D. = Diaphragm.

(B.)

L. = Lung.
Pl. = Pleura.
D. = Diaphragm.
K. = Kidney.
S. = Spleen.
D. C. = Descending Colon.
IL. = Ileum.
Du. = Duodenum.
C. = Cæcum.
U. = Ureter.

THE VISCERAL ANATOMY OF A DOUBLE FEMALE MONSTER.

By E. H. BENNETT, M.D., F.R.C.S.;
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AND

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Chief Demonstrator of Anatomy, Dublin University.

[Read in the Section of Anatomy and Physiology, May 31, 1901.]

The following brief history has been obtained with reference to the birth of the specimen before the Academy this evening. The mother is a young woman, aged twenty-eight, and a primipara. She had been seven months pregnant. The presentation was a vertex, the larger head being born first, followed immediately by the smaller. The labour was not unusually difficult. There is no history of anything happening during utero-gestation to account for the premature births. The placenta and funis are each single, but the constituent parts of the latter are doubled. The extent of fusion of these twins, you will see, is not very great; they are joined from the top of the sternum to the umbilicus. The object of the dissection and examination of the viscera is, as you will anticipate, to determine if it could have been possible to have separated the infants at birth.

In order to obtain a clear view of the thoracic and abdominal organs as they lay *in situ* the following dissections were made:—The entire right side of the abdominal and thoracic parietes of fœtus A. was removed, a similar dissection being carried out on the left side of fœtus B. A band of skin, three-quarter inch broad, was left intact in the middle line to keep the fused diaphragms and the viscera in relation to them

in position. Having noted that the viscera were separate, except the livers and hearts, the band of skin was next removed, so as to get an uninterrupted view of these organs. An examination of the livers revealed the fact that they were fused to a considerable degree. Viewed in profile, they appear as a wedge-shaped organ, with its base, which is elongated and curved, looking upwards, and its apex downwards. An incision, sufficiently extensive to separate the twins, would divide the amalgamated livers into two equal parts. The pericardial sacs are completely fused, forming a single cavity. The auricles of the hearts are united, and their cavities freely communicate with each other. There are no indications on the surface marking off the right from the left auricular portions of the heart, but the four appendices are separate. The ventricles of one fœtus are joined to those of the other, but only superficially, the whole four chambers being shut off from one another. The union of the ventricles—indicated on the surface of the heart by a deep constriction—takes place to the right of the middle line, so that an attempt to sever the twins would necessitate a cut that would enter the ventricular cavities of one fœtus, leaving the other with its own heart and part of the heart of its fellow.

But the fusion into a single cavity of the auricles, to say nothing of the large amount of union which has taken place in the livers, shows quite sufficiently that it would have been an anatomical and surgical impossibility to have separated the twins at birth successfully.

end is more massive than usual, *and is completely fused with the tibia.* The inferior interosseous ligament and a small part of the lower end of the interosseous membrane are converted into bone. Thus the left inferior tibio-fibular joint is replaced by continuous bony union, whereas *on the right side the corresponding joint is normal.*

N.B.—Multiple 'exostoses,' from the size of a pea down to a grain of fine shot, occur scattered over the shafts of both tibiæ and fibulæ. They are also present on the femora, but are much less plentifully distributed.

Tarsal, Metatarsal, and Phalangeal Bones.—On the whole the bones of the feet do not deviate to any extent from the average form. The protuberances are practically bilateral. On the os calcis the perineal spine is very prominent and sharp. The same may be said of the two tubercles on the under surface which give attachment to the abductors of the great and little toes and other muscles. The strongly developed tendon of the tibialis posticus is attached to a large conical eminence, continuous with the tuberosity on the inner side of the scaphoid. On the same bone (but only on the left foot) is there a distinct facet for articulation with the cuboid. On the internal cuneiform of both feet (larger on the left) is an eminence to which the tendon of the tibialis anticus is inserted. The spur of the fifth metatarsal is larger, and projects further out than usual.

UPPER EXTREMITIES.

Clavicles.—Each clavicle is strongly curved. The surfaces from which the pectoralis major, the sterno-mastoid, and the deltoid arise are abnormally roughened. On the left bone the groove on the under surface for the origin of the subclavius muscle is converted into a narrow ridge, which, externally, becomes continuous with the conoid tubercle. It is interesting to observe that the parts of the clavicles

which give attachment to ligaments are not unduly prominent. To this there is one exception—viz., on the right side the trapezoid line projects downwards about its middle, resembling a second conoid tubercle.

Scapulæ.—Small multiple 'exostoses' occur on the upper and under surfaces of the spine and acromion processes. Each coracoid process is thick and rather short when compared with the average type. The part which gives attachment to the pectoralis minor is elevated and roughened. The lines on the venter of the scapula, which give origin to the tendinous intersections of the subscapularis muscle, are here and there represented by spicules of bone.

N.B.—The supra-spinous ligaments are not ossified.

Humeri.—These are powerfully built bones. The small tuberosities project anteriorly for a distance of 2 cm. The left one is slightly the larger. The bicipital furrows are broad and deep, being bounded by prominent lips. The deltoid eminences extend downwards and inwards as thick rough lines, 6 cm. in length. The supra-condyloid ridges and condyles are well marked.

Ulnæ.—The ulnæ show less development of bony projections than the other long bones of the limbs. The triangular subcutaneous surfaces are prolonged for a distance of 1 cm. above the olecranon in the form of slightly curved, beak-like processes. The tendons of the triceps attached to these are very powerful. The surfaces for insertion of either brachialis anticus muscle are elevated and roughened to a marked degree, and the supinator ridges are very pronounced. The lower ends of the ulnæ appear more massive and expanded than usual, and here a few small 'exostoses,' similar to those found on the tibiæ and other leg bones, are present.

Radii.—The radius of the right side closely resembles that of the left, and presents the same peculiar markings. The

posterior portions of the tuberosities appear as thick and roughened ridges, to which the bicipital tendons are inserted. The convex area of bone, which gives insertion to the pronator radii teres, is produced into a short conical process. This is larger on the right side. A few small protuberances occur scattered over the shaft. But the most conspicuous abnormality, and one which is equally developed on the two sides, is a strong process of bone springing from the interosseous ridge 11 cm. from the summit of the radius. It is broad at its base, but tapers gradually as it inclines downwards and inwards. It is 3·5 cm. in length, 5 mm. in breadth, and is composed of dense, compact bone. The greater number of fibres of the interosseous membrane run in a parallel direction with this bony process, and it seems quite evident that a partial ossification of the membrane has taken place. The presence of such an extra projection on the radius seems to be of little advantage, except, perhaps, that it affords additional surface of bone for the origin of muscles, the long flexor of the thumb and the deep flexor of the digits arising from it by definite slips. But had the process in question extended 1 cm. further inwards it would have come into contact with the interosseous ridge of the ulna, and then, in all probability, the movements of pronation and supination would have been seriously interfered with. The remainder of the interosseous membrane of both forearms is normal, except at the lower part, where it is thin and very weak.

The Carpal, Metacarpal, and Phalangeal Bones.—The carpus, like the tarsus, shows but little variation. The pisiform is much larger than the average. The hook of the unciform and the tuberosity of the scaphoid project forwards to a great extent. The metacarpals and phalanges, though strongly built, do not exhibit any abnormally developed protuberances.

SUMMARY.

I have used the term 'exostoses' in its widest sense. Strictly speaking, it is employed to denote a pathological condition, signifying, in fact, a bony tumour. However, for want of a better word I have adopted it to express the idea of projections or processes of bone, which are situated about the regions of muscular attachments, and always present, although of smaller size, on ordinary healthy bones. But the main interest is centred in the fact that the bones which I have attempted to describe present not only abnormally large and roughened surfaces or tubercles, but that, *pari passu* with their excessive development, these have become altered in shape. For instance, the gluteal ridge is developed into a series of bony spicules, the roughened surface for the insertion of the pronator radii teres is elevated into a regular cone, while the digital fossa is replaced by a digital process, and so on.

The points of interest may be summed up as follows:—

1. The absence of osseous deposits in nearly all the ligaments (including the supra-scapular, so often ossified).

2. The partial ossification of the interosseous membranes (bilateral in the upper limb, unilateral in the lower limb).

3. The bilateral symmetry of most of the 'exostoses,' which is more perfect in the upper than the lower limb.

4. The complete fusion of the lower end of the left tibia with the fibula, with obliteration of the lower tibio-fibular joint.

5. The absence of rheumatoid or other joint affections.

6. The excessive muscular development of the subject.

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